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Momentous Months

IN the field of technical development the remaining months of this year will be momentous ones for British commercial flying. Chief among the important projects due to embark on their development programmes are the Bristol Brabazon long-range trans-oceanic transport and the pure-jet, ultra-fast de Havilland Comet for medium/long-range work. Both designs, in their respective classes, are unique, and either one is a potential founder of British supremacy on the international airways. On these sharply contrasting types, when they take the air in the weeks ahead, world-wide attention will be fixed. Having received their *baptèmes de l'air*, they will join a formidable company of new British airliners, most of which, being powered by turbines of proved efficiency, are unchallengeable.

The full worth of the experience already accumulated by the Vickers Viscount, Armstrong Whitworth Apollo, Avro Tudor VIII and Vickers Nene-Viking (and, it follows, the length of our technical lead) is difficult to compute at this stage. To the types named will be added this year the Handley Page Hermes V (a turboprop development of the Mk IV), the Vickers Nene-Viscount, and the Mamba-Marathon.

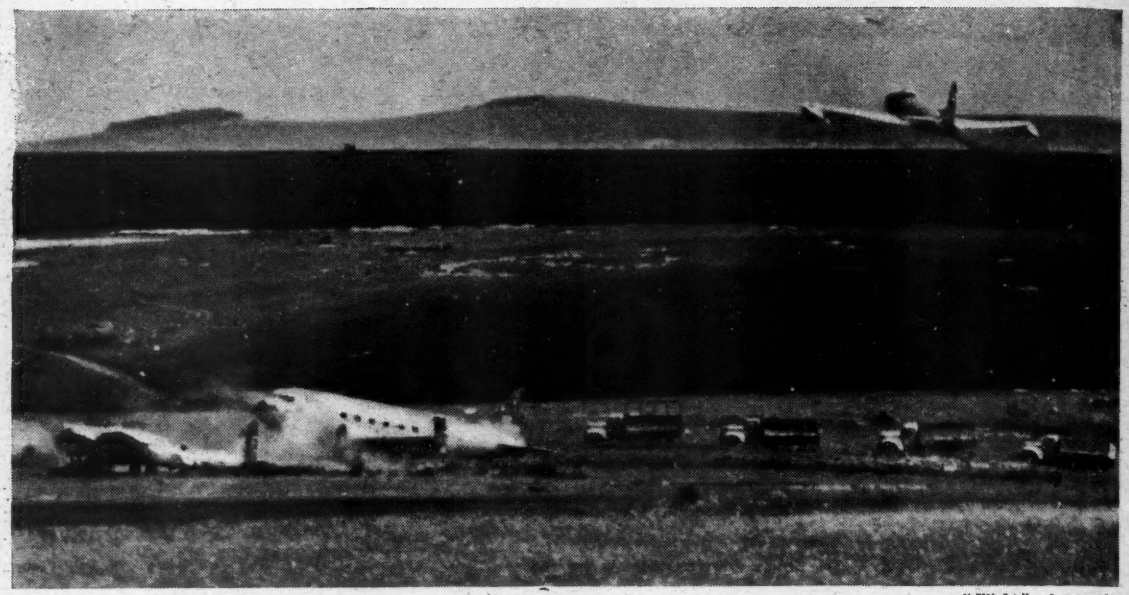
Envy of Britain's new transports is openly admitted abroad and concern is voiced at the absence of competitive equipment. American plans for new airliners remain ill-defined; meantime, Britain is surely assuming the technical lead. Though two key types—the Saro Princess flying ship and Bristol 175 Constellation replacement—will not be flying for a year or two, the Farnborough display in September—including, as it may, the Brabazon, Comet, Viscount, Apollo, Hermes, Ambassador, and Marathon—will represent a new high-water mark in the turning tide of our fortunes.

Dangerous Road

FOR some time past we have shared the fears of many who are engaged in the business of civil aviation—commercial, club or private—that a dangerous lack of planning persists and that left and right hands are working independently in quarters whence foresight and clear-cut leadership should now be expected. Last week we touched upon the financial problems of the clubs, the importance of air-mindedness in the country, and upon fears regarding the future of London airfields for private and charter aircraft. A related aspect of what may be called the threatened decline of private-enterprise flying is perhaps of even greater and more immediate national moment. It concerns the preservation of our potential reserve of air and ground staff. That the country still needs to hold all available reserve strength in readiness is confirmed by the proportion of last week's Commons debates devoted to call-up and building up of Reserves (45,000 for the R.A.F. Reserve) and the announcement of plans for Civil Defence recruitment in the autumn.

We do not subscribe to the opinion that a light-aircraft pilot trained in a civil flying club would be of no use to the Service in the event of another war. Even supposing it be accepted and that we ignore the fact that the clubs (and for that matter the associated taxi and charter concerns) are enabling a very large number of fully trained and experienced pilots to keep their hands in—even then there remains to be considered the very large ground organization engineers in all categories, flying control, met. and traffic staffs, who would, as in 1939, be in a position to make a vital contribution to a wartime Air Force. Irreparable harm will be done to the nation's prestige and potential air strength if many of the flying clubs with their rapidly diminishing reserves are unable, as they fear, to survive for another season.

In the key trade of ground engineering, the Corporations have already of necessity shed a proportion of their staff, while others have resigned, reportedly, owing to dissatisfaction with conditions. Although some have found similar work by virtue of the Air Lift and recent scheduled-service and charter agreements, those who have not found vacancies—and it is feared that there may be many more if the tendency continues—will enter other industries and be lost to aviation altogether. The aircraft industry can ill-afford to lose these men, and the Services, surely cannot remain disinterested.



"Flight" photograph.

With the visible tail-pipe efflux characteristic of American jet fighters, a Shooting Star of the U.S. Air Force pulls away from a beat-up of derelict aircraft on the West Down ranges.

A STUDY IN TACTICS

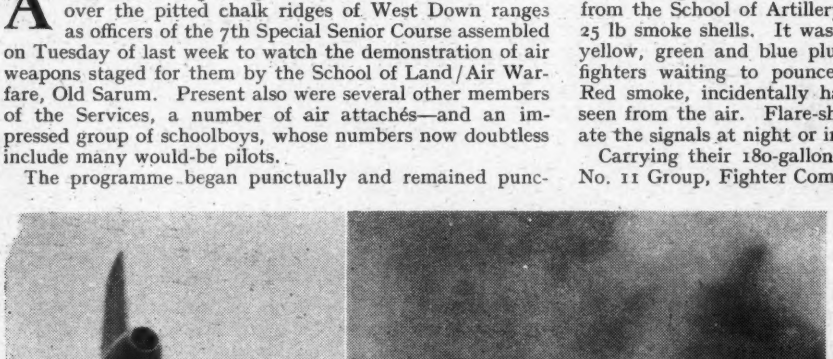
Modern Air-support Methods Demonstrated on Salisbury Plain

A STIFF breeze piled great masses of cumulus cloud over the pitted chalk ridges of West Down ranges as officers of the 7th Special Senior Course assembled on Tuesday of last week to watch the demonstration of air weapons staged for them by the School of Land/Air Warfare, Old Sarum. Present also were several other members of the Services, a number of air attachés—and an impressed group of schoolboys, whose numbers now doubtless include many would-be pilots.

The programme began punctually and remained punctual throughout with a colourful display of pyrotechnics from the School of Artillery, in the form of neatly placed 25 lb smoke shells. It was evident that the resulting red, yellow, green and blue plumes are an effective guide for fighters waiting to pounce on front-line enemy targets. Red smoke, incidentally has been found the most easily seen from the air. Flare-shells, of similar calibre, illuminate the signals at night or in dull weather.

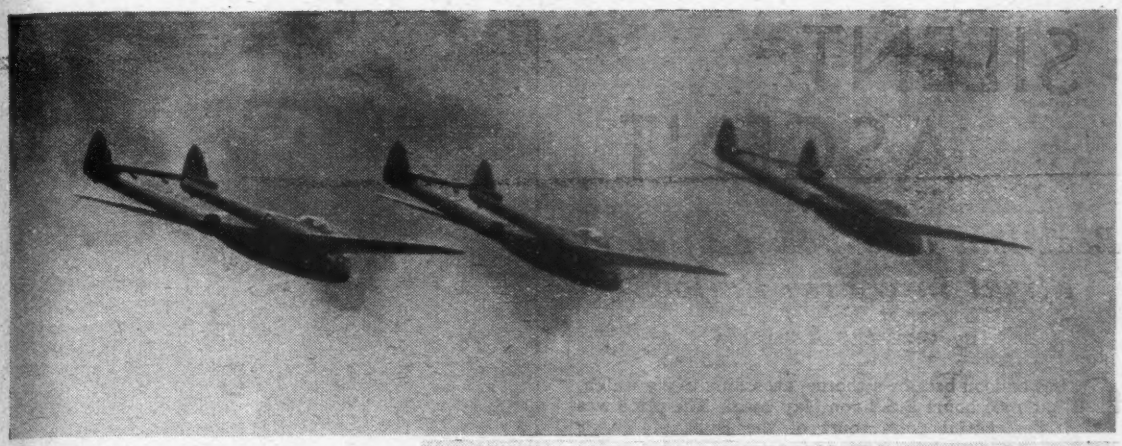
Carrying their 180-gallon belly-tanks, four Meteor 4s of No. 11 Group, Fighter Command, were the first aircraft to arrive. More smoke-shells threw a red veil over an exposed line of lorries—the target for sixteen Hispanos—while the Meteors made a seemingly peaceful circuit of the ranges. Their approach in pairs took on a more businesslike aspect as noses dipped and throttles opened; a fountain of rebounding tracers showed that, in two successive runs, accuracy was good and that the Meteor is a steady platform for four 20 mm. guns.

Displaying slight differences in technique, but equal proficiency, were four F-80 Shooting Stars of the U.S. Air Force, likewise loaded with extra fuel, in the now familiar wing-tip tanks. Bat-



"Flight" photograph.

A concluding demonstrator was this Meteor 4 of Fighter Command, "stopped" by the camera in two poses which speak for the liveliness of its performance.



Credit for the superb station-keeping of the three aerobatic Vampires, despite bumpy conditions, is due to the skill of No. 247 Squadron pilots. A fourth "individualist" aircraft also demonstrated the Vampire's powers. (Right) The air attachés of several countries attended the Old Sarum demonstration, and appeared to be greatly impressed.

"Flight" photographs.

tered airframes, recognizable as a Dakota and two Mosquitoes, received attention from their nose-mounted .50 machine guns. Simultaneously with the crackle of the lighter American weapons one observed that a small panel opened in the nose of each F-80: through this retractable chute are jettisoned spent cartridge cases and belt-links. The Shooting Stars appeared to maintain their fire close to the target, and make a steeper and faster exit, despite the Meteor's superior rate of climb.

Representing the Central Gunnery School, four rocket-firing Spitfire 16s next began a series of attacks on a group of tanks, but a number of unspectacular puffs of dust denoted that some of the projectiles (each aircraft carried four) had failed to explode. One effect of watching air armament activity from a safe distance is of confusion caused by the lag between sight and sound—at times it is almost impossible to link each explosion with a corresponding flash. This effect is particularly marked in rocket-projectile assault, when the roar of engines, the rush of rockets in flight and the crash of strikes on the target are combined in a lethal-sounding symphony, doubtless with petrifying results at the receiving end.

There was no confusion, however, in a dashing onslaught by four Sea Furies from the School of Naval/Air Warfare. Thin white smoke-trails from sixteen 60 lb rockets streaked a temporary patch of blue sky as the Naval fighters struck with a single salvo. Before the black smoke of the bursts had drifted away, a further 16 missiles were despatched by a single Firefly, also from S.N.A.W.

Diving from some 6,000ft, four more Spitfire 16s from the Central Gunnery School each unloosed a brace of 250-lb bombs at an angle of 40-50 deg. This method, although not as accurate as the rocket attack, offers considerably greater possibilities of damage by blast, and was used with success against specialized targets, such as V.2 sites, towards the end of the war.

Paving the way for eight Lincolns, which were to demonstrate long-range tactical support, three Mosquito 16s of Bomber Command speedily surveyed the target. Two aircraft deposited, respectively, a red and a green target indicator, while the third, after assessing the accuracy of their placing, ordered the approaching Lincolns to "bomb on the green", remaining in the area to fulfil the obligations of a masterbomber. Seven of the heavies, which made a stately run-up in well-spaced line-astern formation, dropped their 500-pounders near the aiming area, although seeming to overshoot slightly, but the eighth apparently decided not to lay its egg. Low cloud prevented a direct comparison between R.A.F. and U.S.A.F. methods in this application, but the "lead ship" of six B-29 Superfortresses of the U.S. Third Air Division, which followed the Lincolns, appeared to select the right moment for the formation to release its 100-lb bombs.

Blind bombing, under the guidance of a mobile radar-control post, was convincingly demonstrated by four Mosquito 35s from B.A.F.O. Visible only momentarily as they flew in at 12,000ft and 190 kt, the light bombers placed a cluster of 25-lb smoke-bombs within 100 yd of their unseen target. Such commendably close control can be exercised within a range of 25-35 miles; more warlike missiles of better aerodynamic form than the practise bombs, would have fallen nearer. Any apprehension among the audience was allayed by the commentator's assurance that the navigators were identifying, through gaps in the cloud, certain check points on the run-up.

Although bomb and rocket attachments are carried by R.A.F. and U.S.A.F. jet fighters—the Vampire 5 is to become the R.A.F.'s standard fighter-bomber—the otherwise comprehensive demonstration failed to show the full tactical flexibility of the more modern fighter. This lapse was indirectly covered, however, by flawless low-level handling of four Vampire 3s by pilots of No. 247 Squadron. Two spirited individual exhibitions, by a Meteor and a Shooting Star, were a fitting conclusion to a high-speed programme. On the following day, at Netheravon, transport support was displayed by the R.A.F.'s latest equipment and methods. The Hastings, Valetta and Devon took part and there were demonstrations of glider-snatching and towing, parachuting and supply-dropping.

SILENT ASCENT

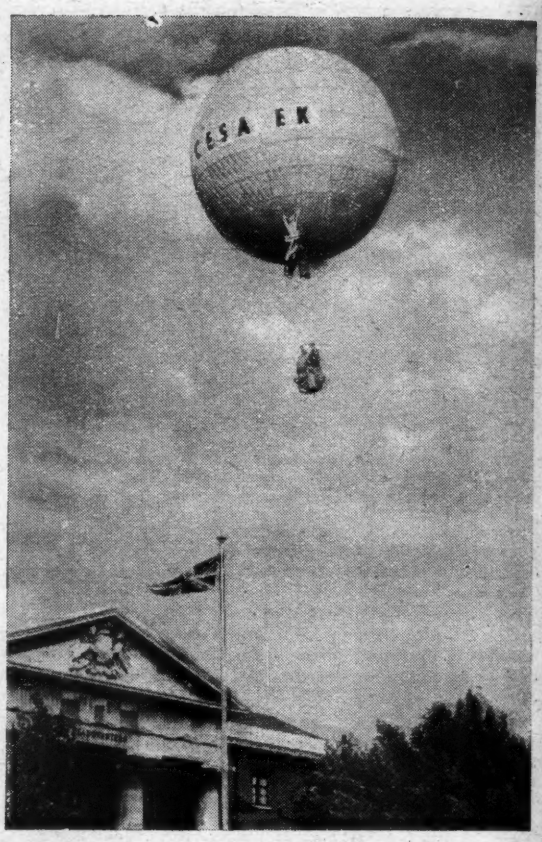
Reactions of a Power Pilot to Flight in a Free Balloon

By CHARLES GARDNER

OUR balloon became airborne, according to my watch, at 1908 hours B.S.T. on May 29th. The place was the central grass court of the Duke of York's Headquarters, Chelsea, and the occasion was Chelsea Week, whose organizers had had the pleasant and commendable idea of reviving Chelsea's historic association with balloon ascents. As C. H. Gibbs-Smith pointed out to the quite considerable crowd, the ascent was taking place almost exactly on the spot from which M. Blanchard and Dr. Sheldon had made Britain's second-ever balloon flight in 1784 (the first was by Lunardi, earlier the same year from Moorfields). Also, we were hard by the site of the old Cremorne Gardens from which our grandparents and great grandparents had regularly aeronaut-ed in the 19th Century. There was, then, no lack of precedent for the choice of Chelsea as the site for the first free-ballooning to take place in Inner London since the days of the Great Exhibition.

For two hours before the ascent M. Charles Dollfus, the French air historian—whose claim to be Europe's leading aeronaut is, I believe, unchallenged—had busied himself with the preparations for his 288th ascent. Save for the substitution of grey flannel trousers for his knickerbockers, M. Dollfus was dressed as at the Royal Aeronautical Society Garden Party at White Waltham—the same very large, yellowish, flat-peaked cap and that wonderful tie, which has embroidered on it the whole history of lighter-than-air flight.

Lord Sempill wishes M. Dollfus bon voyage, the Mayor of Chelsea looks on, and the author takes a back seat behind the barograph.



". . . the balloon gave a leap in its smooth upward journey, and the flagstaff dropped harmlessly below."

M. Dollfus had with him, as official assistant, M. Jacquet, himself a champion aeronaut, and a pupil of whom M. Dollfus is very proud. ("It is for myself I am proud," he explained. "If the pupil is a champion, the master cannot be all that bad, can he?")

Of other assistants M. Dollfus had many. An R.A.F. crew from Cardington was in charge of the hydrogen truck and, among others lending a hand in an experienced and knowledgeable way, were Lord Sempill, Mr. H. R. Gillman of the Air Charter Association, Mr. C. H. Gibbs-Smith, Sir Francis McClean, Mr. Geoffrey Dorman and ballooning's latest recruit, Dr. H. Roxbee Cox. Lord Ventry could not be present, but rang up from Bournemouth with reassuring weather information from the south coast.

Owing to the imperious demands of B.B.C. timing, M. Dollfus and I had to be settled in the basket some time before the actual ascent. Once we were in, and my walkie-talkie transmitter was strapped on to the outside, the balloon was trimmed so as to have the right amount of lift. This balancing was a tricky and expert business. Sand ballast was added and then taken away again, and there were several tests during which the many strong hands which were holding down the balloon let it go for a second to judge the immediate rate of climb. When this "lift" was pronounced sufficient to clear the down-wind top of the Duke of York's H.Q. building, some hundred yards away, the balloon was held down manually, much against its will, while the business of broadcasting went on, and while hospitable gunners sent us out, by a mess waiter, a welcome and ceremonial glass of sherry.

And then, at 1908 hours, M. Dollfus leaned over the basket; cried "Let go," and we were suddenly but smoothly airborne at an initial rate of climb of about fifteen feet a second.

The sixty-year-old basket, which I judged as being about a yard square by three and a half feet high (it came up to my stern) could just, at a squeeze, hold the two of us, plus about ten bags of sand ballast. Tied onto the basket or the rigging lines by string were our three instruments: two pocket-watch-type altimeters (one in feet, the other in metres) and a barograph. In workbasket-like pockets inside the car were a map, a trowel for the sand, and M. Dollfus' famous hunting-horn—airliners for the warning of. (Mistrusting the hunting-horn, M.C.A. and Jimmy Jeffs had made their own utilitarian and less picturesque arrangements for notifying Heathrow and Northolt traffic of our presence.) The two balloon controls which dangled down into the basket were a valve cord, to release hydrogen through the top valve, and a rip-cord (coloured red) to let out large quantities of gas in a rush after landing.

The weather, incidentally, was good, with clear skies, and a ten-knot wind from due west.

Take-off Boost

At take-off M. Dollfus, cap in hand, bowed graciously to the cheering crowd in the traditional manner, but, at the same time, flickered his eye at the H.Q. flagstaff, which at one time threatened to intrude itself across our track. In a flash he emptied the whole contents of one ballast bag over the side; the ballon gave a leap in its smooth upward journey, and the flagstaff dropped harmlessly below. We heard later that the ballast sand fell on an Army piper and successfully clogged his instrument for the rest of the evening.

While this was happening I was (I am told) sitting on the edge of the basket with much of my c.g. overhanging the side. I was busy with my radio at the time, and it was not until I had time to take a glance over the side that I retreated hastily to the full safety of the basket.

By the time we had reached 500ft, in an average climb-path of about 45 or 50 deg., I had had time to log three impressions:—

(1) The smoothness of the ascent.
(2) The uncanny silence, through which still came to us the cheers of the crowd below.
(3) The dead, and almost deathly, calm of having no relative movement to the wind.

We climbed up to about 2,000 feet, and M. Dollfus then pronounced us to be "in equilibrium," and to be drifting eastwards at about ten miles an hour. Below us was the familiar panorama of London seen from the air, but this time viewed in complete and utter silence, and in a calm which killed any sense of movement of any kind.

I leaned over the basket and had a look at Buckingham Palace as we drifted along the line of the Mall. Then a turn-round to look at St. Paul's, followed by a hurried glance directly down at the river. It was then—I think—that I decided I didn't like ballooning.

In the first place I felt far too near the great open spaces, and could gratefully have used some good thick Perspex between me and the scenery. This was, I knew, completely illogical, because commonsense told me that the basket was perfectly safe and quite adequate. But it was the emotions which woudn't be convinced, and I began to get that tingling in the feet which some of us have when taken to the pinnacle of a high building.

The radio kept me busy again for a time, and I received on it the cheering news from Chelsea that we were being followed accurately by the T.A. radar and guns.

As we went over St. Paul's, and began to get just a touch of northing into our easterly track, I had worked out some rough explanations of my unreasoning dislike of being suspended at 2,000 feet above London. In order of personal importance they were:—

(1) The lack of any perceptible movement *vis à vis* the ground (the wind was very light, and our ground speed at this time was about five miles an hour).
(2) The lack of noise and wind movement. The earthly sounds of cars and railways which came up to us only heightened the general feeling of "queerness."
(3) Having so much of oneself above the level of the basket, and the almost directly downward view which resulted.

Number three of the above was really the least important factor, because I later found that half-squatting in the basket did not relieve the feeling of tension, and that, indeed, one was happier when standing up and holding on to the rigging lines. The downward view should not have mattered either, because I have never had the same feeling when taking drifts in various powered-aircraft, or even when standing on the brink of a doorless paratroop Dakota and looking directly below.

We drifted on up the Mile End road and the Southend Road—and by this time we had descended to 800 to 1,000 feet, and the wind had freshened.

This had an immediate effect for the better as far as I was concerned. There was now a general feeling of movement about the flight, and I could see quite a definite ground-speed. This banished apprehension as by magic and, for a quarter of an hour, I really enjoyed myself, sitting on the basket edge, waving to the people below, and discussing my previous uneasiness with M. Dollfus.

He said that many powered-aircraft pilots felt the same thing and, in his view, uneasiness was caused primarily by lack of apparent movement (subconscious fear of stalling?) and secondarily by absence of noise and the other familiar surroundings of flight.

In the Hornchurch area we climbed up again, and once more unreasoning apprehension mixed with some kind of vertigo set in. For a moment I understood that common impulse of people at great heights to throw themselves down. Looking upwards at the balloon did not help; it only accentuated. Later Dr. Roxbee Cox told me that on his flight the only time he felt queer was when he looked up at the envelope.

For the final ten minutes we were down to 800 feet, and all was well again.

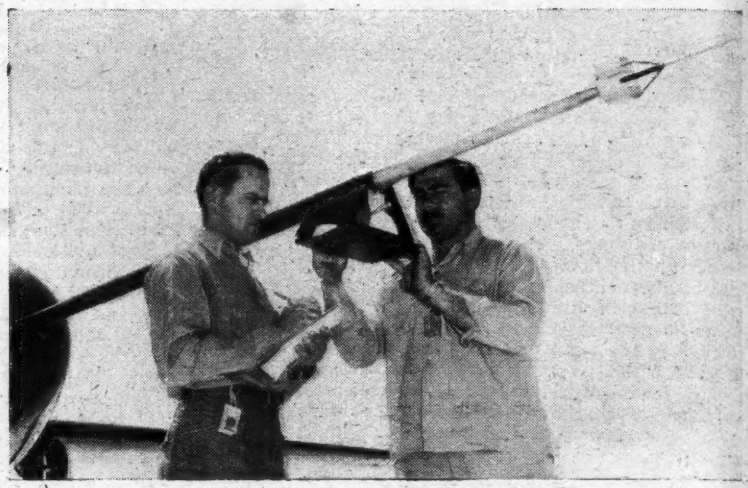
M. Dollfus chose a landing field by the side of a narrow roadway (we had to remember our retrieving motor cars), and, at 300 feet, he threw overboard 180 feet of trailing rope which would act as a brake on our forward speed. Also thrown overboard was a sand-filled "bumping bag" on a 50-foot rope. This was to give a last-minute reserve of lift when the bag became groundborne and its weight was thus taken from the balloon.

Controlled Descent

By releasing hydrogen through the top valve, we came down into the chosen field, but as it was a cultivated one M. Dollfus decided to take-off again, and by use of the "bumping-bag lift," we hopped nearer to the roadway. Once again we settled down (knees relaxed for impact as for a parachute-drop), but were then threatened with a barbed-wire fence. Another very skilful hop took us over this fence and the bumping bag, which tangled in it, brought us gently to rest. The rip-cord then came into play, and the rest was a matter of gathering in the envelope and packing the balloon and basket into the lockers of two retrieving cars, which were on the spot before we had climbed out of the basket. We landed at 2020 hours, one mile from the village of Havering-Atte-Bower, near Romford. As I had been amusing myself during the landing approach by blowing lustily on the hunting-horn, the whole neighbourhood had been alerted, and within two minutes of touching-down we were surrounded by hundreds of cyclists, motor cyclists and motorists, who arrived in that order. M. Dollfus bore this invasion with a gentleness and good nature all too rare in 20th-century England.

I wish I could say I was now converted to the gracious art and sport of ballooning. If all flights were at 1,000 feet maximum and in enough wind to provide a perceptible ground speed, I would be. But I do believe that this is very much a minority viewpoint, and that such apprehension as I had was purely personal to me. I am very certain that someone unused to powered flying would not feel the slightest qualm—nor would that large and fortunate majority who "have a head for heights."

HERE AND THERE



YAW MOVE: All American high-speed aircraft are now being equipped with long antennae, mounted, not on the wing but in the fuselage nose, for accurate recording of speed, altitude and yaw. That shown above is fitted to the Northrop Scorpion all-weather fighter, and incorporates electronic transmission of the factors recorded.

Activity at Woomera

TRIAL launchings are due to begin on the Australian rocket range at Woomera, following completion of the launching-zone platform. Accommodation has now been provided for all the men working on the maintenance and construction of the site.

Nosewheel Cubs

PIPER Cubs fitted with nosewheel-type undercarriages are now flying in America. The Testerman SPM-1 nosewheel installation is C.A.A.-approved and has now been installed on 20 aircraft. It can be fitted in four to six hours without welding or structural alteration.

A Hughes Helicopter

MR. HOWARD HUGHES, the millionaire aircraft manufacturer and film-producer, is reported to have begun construction of a twin-jet military helicopter capable of lifting up to ten tons of war equipment.

Clipper Inauguration

OPENING Pan American World Airways' new service across the Atlantic, the first Stratocruiser to make a regular commercial crossing left Idlewild on June 2nd. Among the 56 passengers were nine U.S. competitors in the international athletic meeting at the White City.

Pure-Jet Viscount

"INFORMED circles" in this country will not have been surprised by Mr. G. R. Edwards' reference, in his lecture before the Institute of Aeronautical Sciences, to a pure-jet development of the Viscount. It will have two Rolls-Royce Nenes, or similar-type turbojets, in wing-mounted nacelles, close in to the fuselage, and may present strong competition to the four-Derwent A. V. Roe (Canada) C.102, the prototype of which is structurally well advanced.

New Fairey Clyde Adviser

IT is announced by the Fairey Aviation Company that Lt. Col. R. T. Elvish, late of the Royal Australian Army Ordnance Corps, is to collaborate with the Fairey Clyde Aviation Company, Pty., Ltd., in the setting up of the firm's new armament development division in Southern Australia. He is due to reach Adelaide on June 14th. Lt. Col. Elvish, who joined Fairey's research division in December last, was appointed to the Australian General Staff in 1940, and became Assistant Director of Armament, A.H.Q., before attachment to the Ministry of Supply (England) during the earlier part of last year.

Invasion Anniversary

THIRTY-SEVEN American war correspondents who arrived at London Airport on June 3rd, before beginning a tour of former battle areas in France and Germany, were told by Major Leon Johnson, who commands the Third U.S. Air Division in this country, that joint co-operation between the R.A.F. and the U.S.A.F. could not be better. The correspondents took part in a memorial ceremony on the Normandy beaches.

Indian Interest

THE general manager of Air India, Ltd., Mr. K. J. Bhore, flew the second prototype of the Airspeed Ambassador on a recent visit to Christchurch Airfield. Mr. Bhore is not only a competent aircraft engineer, but a pilot of considerable experience. Last year he made the delivery flight from California of one of Air-India's Constellations.

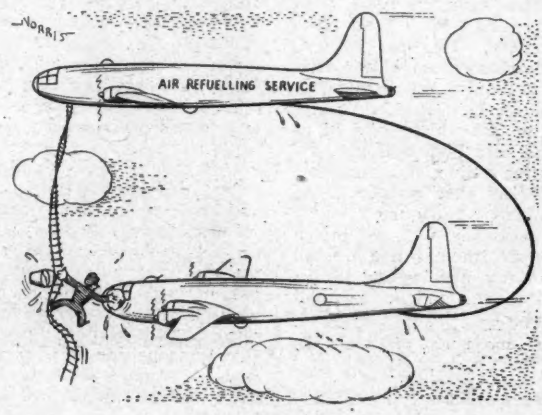
R.A.F. Fire Enquiry

FOLLOWING a fire which destroyed many thousands of incendiary bombs, stored at an R.A.F. dump at Harpur Hill, near Buxton, a court of inquiry will be held. Lightning has been suggested as one possible cause for the fire, which was brought under control before the blaze had reached all of the 588,000 bombs on the dump.

B.A.F.O. Gliding Record

SUBJECT to confirmation by the British Gliding Association, F/O. K. Hirst, of B.A.F.O., has set up a new British national multi-seat glider distance record, with a 141-mile flight, on May 28th, from Gutersloh to Hamburg. His second pilot was A/C. K. Simpson, who, like F/O. Hirst, was a member of the Wahn team competing in the 1949 B.A.F.O. gliding contest. The flight, which was originally intended to reach Hoya, 87 miles from Gutersloh, took five hours.

F/O. Hirst began his gliding career with the A.T.C. at the age of 15. Entering the R.A.F. in 1944, he completed his pilot training two years later and was posted to No. 98 Mosquito Squadron. He won his International Silver "C" badge in last year's B.A.F.O. gliding competition. Following his record flight, he may be selected to represent B.A.F.O. in the British National Gliding Contests this year.



Third Atlantic Jet Crossing

FIFTEEN F-80 Shooting Stars of the U.S. Air Force left Dow Air Base at Bangor, Maine, on Friday, May 27th, on their way to join the 36th Fighter Group at Fuerstenfeldbruck, Germany. Their first call was at Goose Bay, Labrador, and halts for refuelling were planned at Greenland, Iceland, and Scotland. They were followed by two Dakotas and a Skymaster, carrying spares and servicing personnel, and a B-29 "weather ship." The first crossing of the Atlantic by jet aircraft was

HERE AND THERE

made by R.A.F. Vampires of No. 54 Squadron last summer, closely followed by the first West-East crossing, by a formation of Shooting Stars.

A Destroyer Preserved

THE Boeing Superfortress which dropped the first atomic bomb—on Hiroshima—is to be kept permanently in the National Air Museum, Washington.

Shades of the Double Eagle

LAID out on similar lines to the pre-war B.A. Double Eagle, with an inverted-gull high wing, the larger Breda-Pittoni B.P.471 now under construction has two Isotta Fraschini Delta engines and is adaptable for transport, training or photography.

A Show-down Avoided

THE mock combat between a Convair B-36 six-engined bomber of the U.S.A.F. and a McDonnell Banshee deck-landing jet fighter of the U.S. Navy, suggested by Congress, has been turned down by the Joint Chiefs of Staff. The reason given—that such a battle between the two best aircraft of rival services would divulge vital information—can hardly be reassuring to the American public.

Lebanese Percivals

THE building-up of a small defensive air force by Lebanon has started with the acquisition by the Lebanese Ministry of National Defence of two Percival Proctors and three Prentices. The Proctors have already arrived at Rayak. Ex-R.A.F. instructors are to be engaged and the English language may be used, although it would be to the advantage of an instructor to speak French. Flying training will include about 100 hours on Prentices and further experience on Proctors. The purchase of fighter and transport aircraft is in mind.

PROFITABLE GUESS: By making the most accurate estimation of the number of passenger-miles flown by Constellations all over the world, Mme. N. Krontche and M. J. de Bresillon, seen above with a T.W.A. hostess, each won 250 dollars, a free return air passage to America, and a week's holiday in New York. The contest was arranged by Lockheed Aircraft Corporation at the Paris Aero Show.

New Lisbon-London Service

INAUGURATING the first regular service from Lisbon to London by Transportes Aereas Portugueses, a 35-seat Skymaster touched down at Northolt on Friday, May 27th, after a six-hour journey. Among the passengers were Gen. A. Cintra, director-general of Portuguese Civil Aviation (and also C.-in-C. of the Portuguese Air Force) and Col. C. Magalhaes, director-general of T.A.P. The new service will operate once a week, with provision for extra flights in the summer should there be a demand. British European Airways are the British agents for T.A.P.

PROFESSIONAL INTEREST: Inspecting the Brabazon during a recent visit to Filton are (left to right): Mr. A. E. Hagg, technical and design director, Airspeed, Ltd.; Major Hereward de Havilland; Mr. Norman Rowbotham, divisional managing director, Aero Engine Division, B.A.C.; Mr. W. F. Shaylor, commercial manager, Airspeed Ltd.; Mr. J. E. Attwood, "Bristol" A.E.D. with, behind him, Mr. S. W. Mansell and Mr. J. Innes, divisional secretary.

News in Brief

One of the five Tudor 5 tankers of B.S.A.A., which have flown nearly a million miles on the Air Lift, flew the Corporation's 100,000th ton of liquid fuel into Berlin on May 31st.

* * *

On completion of an eleven-week tour of most European countries, Mr. E. S. Safford will take up his new duties of director of sales of the Beech Aircraft Corporation, Kansas.

* * *

Mr. W. H. Lindsey, M.A., deputy chief engineer of Armstrong Siddeley Motors, Ltd., has been elected a Fellow of the Royal Aeronautical Society.

* * *

An amendment has been tabled to the Finance Bill, calling for repeal of the 9d a gallon duty on certain light hydrocarbon oils. Several leading British aviation organizations recently joined in representations to the Chancellor of the Exchequer against the duty.

* * *

From America it is reported that the British and U.S. Governments have reached final agreement over the installation of observation posts in the Bahamas to record the behaviour of guided missiles. The projectiles will be launched from Florida and controlled by radar.

* * *

Work has begun on what will be Europe's largest oil refinery—the Anglo-American Oil Company's new plant at Fawley, near Southampton. Having a planned output of 5,000,000 tons a year, this new project is expected to cost about £37,500,000, and will take about 3 years to complete.

* * *

An aircraft exhibition will be one of the special features of the 28th Annual Bordeaux Fair, which will be held in the Place des Quinconces from June 19th to July 4th. Enquiries concerning the Fair, which covers all forms of modern production, can be made to the Comité d'Organisation de la Foire de Borleaux, Place Gabriel, Bordeaux.

THE PRESSURE-JET HELICOPTER

An Analysis of the Design Factors for Optimum Performance

IN a paper given before the fifth Annual Forum of the American Helicopter Association last month, Mr. L. L. Douglas, chief engineer of the Piasecki Helicopter Corporation, gave an excellent survey of the power design considerations relating to helicopters of pressure-jet type.

As generally conceived, he said, the jet helicopter was powered by reaction thrust at the blade tips. The high-velocity effluxes could be developed by ramjets, pulse-jets or pressure-jets. In the ramjet, air was taken in at the inlet where the dynamic pressure was converted mostly to an equivalent static pressure; the air was mixed with fuel and burnt, resulting in the high-velocity exhaust. The pulse-jet was similar in principle, except that a pressure boost was obtained by means of a vibrating air-inlet valve(s) or resonance column. The pressure-jet cycle differed from the ram and pulse-jets only in that the air was supplied by an air compressor, where the mass flow and pressure ratio might be controlled independently of rotor speed.

In order to establish a basis for presenting relative performance characteristics of the three jet-systems, a rotor tip speed of 600ft/sec was assumed. At this speed, representative tests of ramjets showed a net jet-thrust of 140 lb/sq ft, whilst pulse-jets developed a net thrust of approximately 250 lb/sq ft. A typical submerged pressure-jet system produced a thrust of approximately 475 lb/sq ft. For the same thrust, the relative pressures were, therefore, a measure of the relative size of the three jet-units. It could be shown that the specific fuel consumption was a function of the inlet air pressure ratio developed. At a sea-level tip-speed of 600ft/sec, it was expected that the ramjet fuel consumption would be upwards of 8 lb/hr/lb. Although the pulse-jet showed promise of a better fuel consumption, the inefficient character of present air inlet valves at high speeds had been a serious deterrent to low fuel consumptions. At a sea-level speed of 600ft/sec, a fuel consumption of upwards of 5 lb/hr/lb might be realized.

At a pressure ratio of 3.0, the fuel consumption of pressure-jet systems, however, varied upwards of 2 lb/hr/lb. High-pressure-ratio power-plants, such as hot-gas generators, had been proposed for pressure-jet helicopters, which indicated fuel consumptions of less than 1 lb/hr/lb. Against this relatively low fuel consumption, however, was the weight and complication of the compressed-air power-plant and duct system.

As illustrated in Fig. 1, the high-velocity jet in the pressure cycle could result from burning an air/fuel mixture, either at the blade tips or in a turbine installed in the fuselage. For the tip-burning case, the compressor and its engine might be arranged in various combinations. The simplest but heaviest was one (a) where a conventional reciprocating engine drove a separate compressor. To eliminate the problems attendant in fan-cooling the engine, and in non-uniform power-delivery to the compressor, a turbine might be substituted for the reciprocating engine. The fuel consumption was higher for the turbine but its installed weight was lower.

A more compact and lighter design (b) was achieved by combining turbine and compressor in one housing so that the one compressor supplied air both to the tip jets and the turbine; however, the power-plant control was quite complicated in that a change in tip burner temperature affected the turbine operation. This undesirable feature was eliminated (c) by using two compressors mounted on the same shaft so that one compressor fed the turbine and the other the tip burners.

The possibility of ducting the exhaust of a standard jet engine to the tips (d) was of considerable interest. The difficulty in design was one of materials capable of withstanding the 650 deg C exhaust temperature at the blade stresses, or in the provision of light-weight insulation around a non-structural duct through the blades. Again, this problem might be compromised by a ducted turbine design (e), whereby the exhaust temperature was reduced by mixing compressor air with the exhaust. From this brief summary of the possible variations in power installation, it was apparent that the pressure cycle lent itself to considerable flexibility in design.

Weight-flow and Pressure Ratio

Turning to aerothermodynamics, Mr. Douglas stated that compressor air power was measured in terms of weight-flow and pressure ratio, where the weight-flow was the quantity of air delivered in lb/sec, and the pressure ratio was that of the air pressure to atmospheric pressure. In the pressure-cycle system, the weight-flow was regulated by the jet nozzle area and the pressure ratio by the tip burner temperature. In arriving at the optimum combination of weight-flow and pressure ratio, consideration had to be given to compressor efficiency, burner life and duct losses.

Usually, the selection of a suitable compressor was limited to a very few of reasonably light-weight and efficient units in the power class desired. These might be of centrifugal or axial-flow, and were designed for maximum efficiency at some particular operating condition. Where best operation for the helicopter called for a departure from the compressor design point, it was necessary to know the relation of compressor efficiency to change in both weight-flow and pressure ratio. A good compressor would attain from 75 to 80 per cent efficiency.

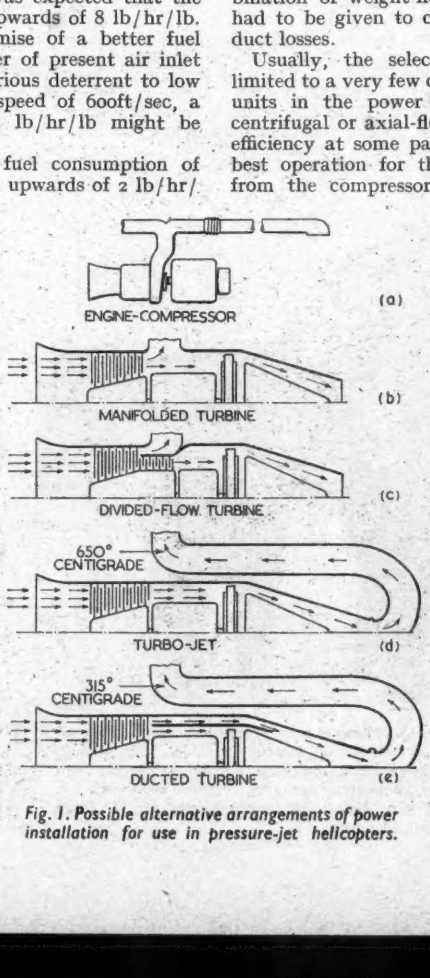


Fig. 1. Possible alternative arrangements of power installation for use in pressure-jet helicopters.

Mr. Douglas postulated that burner design to-day was more an art than a science and was accompanied by an exhaustive test programme where all the variables were individually and collectively investigated. A good pressure cycle blade-tip power-plant by to-day's standards should have a minimum life of 200 hours at a burner temperature of 1,100 deg C. In addition, it should have a five-minute take-off rating at 1,400 deg C, be able to operate over a wide range of fuel/air ratios, and weigh less than 0.15 lb/lb thrust. Obviously, the structural problems in burner design multiply with increase in size.

Many variations of burner and blade-tip design were possible and many had been proposed. Most arrangements, however, fell within two classes. In one, the burners were parallel to the blade duct and the high-velocity exhaust was

The Pressure-Jet Helicopter

turned through 90 deg to develop a jet tangential to the tip path. In this instance, any reasonable variation in duct airflow chordwise was not too serious with regard to the formation of local hot-spots, the pressure drop across the burner was low, and the combustion problems were conventional. However, the design of the 90-deg elbow nozzle was difficult and resulted generally in large losses unless extreme care was taken. Furthermore, it was difficult to avoid local hot-spots at the turn, and this might result in early material failure.

In the second class of tip-burner design, the burners were located normal to the duct airflow. In this instance, the relatively low-velocity air was mixed with fuel at each burner and combustion proceeded chordwise through the burner, thereby eliminating the problems associated with the 90 deg turn of the exhaust. This design, however, required careful attention to the chordwise gradient of duct airflow and, where a relatively large number of burners were used, might result in an excessive pressure drop across the burners.

The duct losses, which came from the delivery of a quantity of air supplied by a compressor mounted in the fuselage and delivered to a burner installed at the blade tips, were difficult to evaluate and, in some designs, difficult to control. These losses were due to a drop in the air pressure during transit from the compressor to the tip and, consequently, in losses of power. The pressure drop was a function of the duct length, duct roughness, hydraulic radius, and to the square of the air velocity. Practical design considerations often dictated a weight-flow and pressure ratio compromise which would result in a reasonably low duct air velocity to minimize duct losses. For conventional designs of the pressure cycle, a duct air velocity up to 200ft/sec permitted a reasonable compromise between duct losses and practical structural design.

In the pressure cycle, it was important to know the variation of power output or jet thrust with pressure ratio and weight-flow, since, under certain conditions, large losses might occur. In Fig. 2 are shown results of an investigation of the relative change in rotor horsepower with a relative change in nozzle inlet pressure for various pressure ratios. At low pressure ratios, even a small pressure drop due to duct losses represented a relatively large percentage of total pressure and resulted in a large power loss. At the higher pressure ratios, the effect of pressure drop on power was relatively small. Because the pressure drop in a rotor system containing many bends, flexible ducts at flapping or teetering hinges, and relatively rough duct surfaces was difficult to evaluate and control, conservative design practice would indicate the use of the higher pressure ratios. Where range and endurance outweighed maximum lift, the higher pressure ratios had the additional advantage in lower fuel consumption, as shown in Fig. 3.

Compressor power was transmitted as a given weight-flow of air at a given pressure ratio. The variation of pressure ratio with weight-flow for constant compressor power was thus of interest. This variation is plotted in Fig. 3, where, in addition, is shown the effect on rotor horsepower of the variation in weight-flow when the compressor power remains the same. Although the design study from which Fig. 3 was derived was based on a single rotor system with a particular disc area, solidity, and tip speed, the effect on lift and fuel consumption due to variations of weight flow and pressure ratio were representative. It was apparent that for high lift and low endurance, the large weight-flow and low pressure ratio combination was best, if the pressure losses could be held to a small percentage of total pressure.

Mr. Douglas concluded his lecture with a reference to rotor design. In general, it could be shown that for maximum jet-rotor power the weight-flow should be high for a given compressor power output, and that, for maximum lift, the solidity should be low. A low solidity, however, made for a small duct which, with a high-weight flow, produced a high duct-air velocity and high duct losses. At the higher weight-flows, the fuel consumption was relatively high. It was, therefore, necessary to make blade layouts and design studies to determine maximum duct area consistent with blade strength and centre-of-gravity location. For a given rotor solidity, the duct area was inversely proportional to the square of the number of blades, making the duct area of the three-bladed rotor only 44.5 per cent that of the two-bladed rotor. On the other hand, the two-bladed rotor needed a vibration isolation system in forward flight which added weight and complication.

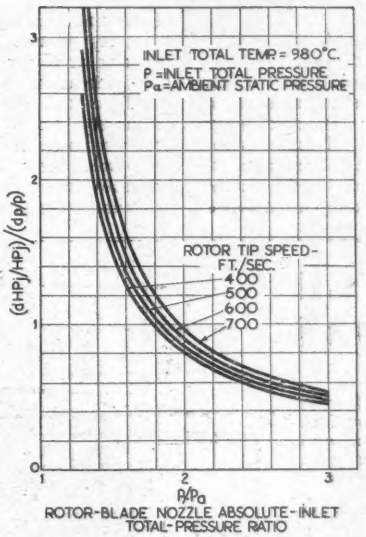


Fig. 2. Curves of relative change in rotor h.p. with relative change in inlet pressure for various pressure ratios.

Blade Structural Design

A limit for the amount of area within the blade contour that might be used for a duct was set by chordwise centre of gravity location. Since it was desirable to maintain the chordwise c.g. forward of the 25 per cent point with a minimum of leading edge balance weight, a compromise was necessary between duct area and weight, because increased duct size carried additional structure aft. Where high pressure-ratios and low weight-flows appeared advantageous, the local effect of the high internal pressure on the blade structure had to be considered. Further, the high pressure-ratios also resulted in higher duct-air temperatures, which in turn necessitated an investigation of the materials used for blade structure at elevated temperatures.

Whether a flapping or teetering blade was used depended on the number of blades, the complication of the flexible duct at the flapping or teetering hinge, and the rotor size. The three-bladed rotor would probably not be used in a low-pressure-ratio design because of the limiting effect of the duct area on power. The design of the flexible connection at either the flapping or teetering hinge was a vexing detail design problem which was easily overlooked and could become a source of recurring troubles.

In a teetering rotor, it was convenient to use a plenum chamber for the flexible connection from the com-

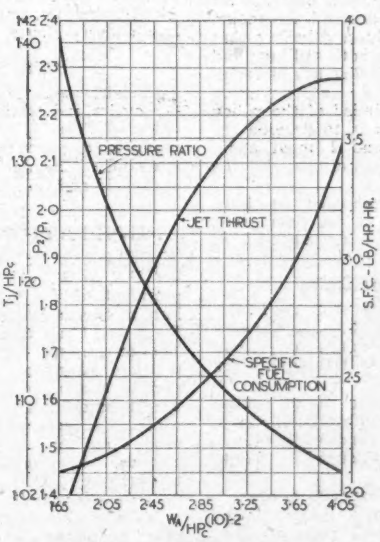


Fig. 3. Curves of thrust, pressure ratio and specific fuel consumption plotted against air weight-flow.

The Pressure-Jet Helicopter . . . . .

pressor duct to the blade duct, and thus avoid a duct which had to rotate and translate in a shearing sense at the same time. Where almost pure rotation existed, as in a flapping-hinge rotor, a flexible duct of rubberized fabric was adequate. In either case, however, care had to be exercised in minimizing pressure losses and pulsations of the compressor due to cyclic change in flexible duct area. The blade and control loads in large diameter rotors were relatively greater in a high acceleration manœuvre for a teetering than for a flapping rotor system, and would be a consideration for the larger rotor systems.

Where the rotor design and power-plant were so intimately related as in the pressure cycle, the design problems were necessarily more complicated. However, jet power-plants were available to-day which made the pressure-cycle jet helicopter very attractive for missions involving large payloads for short range.

PRE-FABRICATED RADIO STATIONS

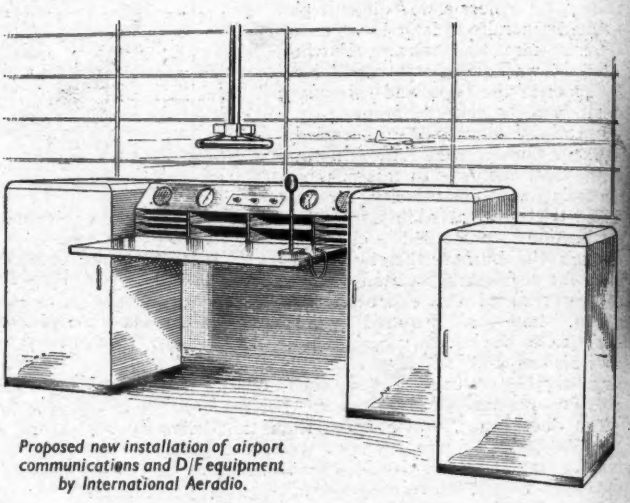
THE design and assembly of a number of pre-fabricated air radio stations for the Burmese Government was recently carried out by International Aeradio, Ltd., at their Bovingdon workshops. As this type of station is likely to prove valuable to those authorities who may require equipment which can be installed rapidly in case of emergency, or who are unable to employ sufficient highly skilled technical staff to supervise normal installation work, I.A.L. have now designed a series of "pack-up" stations providing various facilities. The series at present available is as follows: —

Model A: Two V.H.F. R/T channels (or one plus standby).
Model B: Two V.H.F. R/T channels.
V.H.F. D/F (manual).
Model C: Two V.H.F. R/T channels.
V.H.F. D/F (manual).
Five H.F. R/T or W/T channels.

All these models are designed on the assumption that the equipment will be housed in the control room. If a separate room is available there are further models (D, E and F) providing for remote control. Either one- or two-man operation can be catered for and, of course, other facilities can be included.

Low-power V.H.F. transmitters are used, as it is considered that this type should be adequate for most purposes. If higher-power transmitters are required they can be incorporated. Auxiliary diesel- or petrol-electric generators can be supplied if no other source of power is available.

The stations are completely pre-fabricated with all interconnecting cables and plugs in place and can be readily dismantled for air transport and re-elected on site with the minimum of supervision.



Proposed new installation of airport communications and D/F equipment by International Aeradio.

COMING EVENTS . . . ?

SPEAKING at the recent annual general meeting of the de Havilland Engine Co., Ltd., Major Frank B. Halford (chairman and technical director) concluded his report with these words: —

"Beyond the scope of the gas turbine which uses the air for combustion we are convinced of the demand for rocket motors which carry their own oxygen supply, and believe that they will be needed for special purposes in both military and civil flying. Accordingly we are not neglecting this development.

"In this respect, as always, we are reminded of the policy of the de Havilland enterprise . . . which is to provide the aircraft complete with its power unit, and I must again emphasize the indispensability of this association in the advancing maturity of aviation."

In his review of the year's work, which preceded the above remarks, Major Halford mentioned that at no time, even during the war, had the company's engine output been so great as it was to-day.

AIR TOURIST'S VADE-MECUM

PREPARED for the Private Aviation Division of the F.A.I. by the Air Touring Department of the R.Ae.C., the new *Air Touring Guide to Europe*, 1949-50, is a companion to two practical guides already issued, namely, those dealing with the routes to South Africa and Australasia.

Those responsible deserve congratulation on having packed an extraordinarily large amount of useful information into a pocket-size book (5in x 7½in x $\frac{7}{16}$in) of 222 pages while returning reasonably large type and clear presentation which should facilitate quick reference in the air.

Contents include pre-flight planning (passports, clearance, currency, health regulations, etc.); an eight-language aviation vocabulary; outline maps of nine suggested routes to Continental centres, with course-and-distance tables; details of airfields (classified under countries) hangarage and refuelling costs; conversion tables; and sunrise and sunset tables. In a radio facilities section is a selection of aerodrome approach charts contributed by International Aeradio, Ltd., as typical of those in their *Flight Guide*.

The R.Ae. C. hopes to issue a new edition of the *Air Touring Guide to Europe* each year, with the necessary revisions incorporated. Copies are obtainable at 7s 6d (8s by post) from the Air Touring Department, Royal Aero Club Aviation Centre, Londonderry House, 19, Park Lane, London, W.1.

PROGRESS IN PICTURES

PACKED with photographs of aircraft, ships, cars, motor cycles and stationary engines, a first-rate little book, entitled *50 Years of Progress in Scientific Lubrication*, has been produced to mark the Castrol jubilee. A limited number of free copies is available to readers of *Flight* who apply to C. C. Wakefield and Co., Ltd., Dept. JF, 46, Grosvenor St., London, W.1.

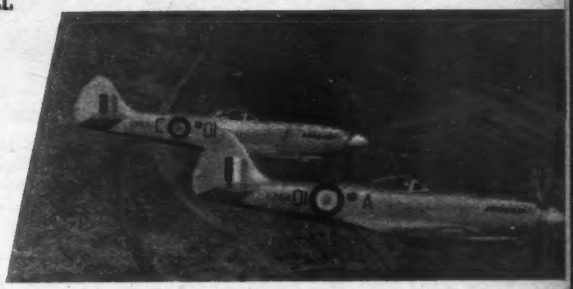
INVITATIONS FROM THE CONTINENT

DOCTOR A. P. THURSTON, M.B.E., D.Sc., M.I.Mech.E., F.R.Ae.S., writes to say that Father R. Amiard, vice-president of the Aero Club de Basse-Normandie, has asked him to invite British aircraft owners to support the second Flers de l'Orne rally, due to take place on June 18th-19th. The programme for the week-end includes an arrival competition, banquets, gala dance, various receptions, a flying display and a competition for Jetex-powered model aircraft. Free hospitality and accommodation is offered to each pilot, while passengers may attend at an inclusive cost of about £4 each from the Saturday morning to the Sunday evening. Entries, which must be made immediately, can be sent in through the R.Ae.C. or direct to the secretary of the Aero Club de Basse-Normandie, Flers de l'Orne, France.

Another Continental event to which Dr. Thurston has been asked to invite British pilots is the "Blue Day" rally and display at Centocello Airport, Rome, on June 29th. Again, entries may be made through the R.Ae.C. or to the Aero Club di Roma, Via Cesare Beccaria 35, Rome.

No. 2 Squadron

By JOHN YOXALL



"Flight" photograph.

A History of Britain's Premier Army Co-operation Unit

"No. 2 Squadron was formed from a nucleus of aeroplane pilots at Farnborough and was placed under the command of Capt. C. J. Burke." In these almost curt words Sir Walter Raleigh, in his first volume of *The War in the Air*, records the birth of the unit. That, of course, is a statement of fact, but it is also true that some of the men and aircraft had been flying for some time in the Air Battalion of the Royal Engineers, which preceded the formation of the Royal Flying Corps on April 13th, 1912.

The R.F.C. (Military Wing) appeared for the first time in the *Army List* for October, 1912, and No. 2 Squadron was shown to have the following officers on the strength: Squadron Commander, Capt. (Temp. Major) C. J. Burke, Royal Irish Regt.; Flight Commanders, Capt. G. H. Raleigh, Essex Regt., Lt. (Temp. Capt.) H. R. P. Reynolds, Royal Engineers; Flying Officers, Capt. G. W. P. Dawes, Berkshire Regt., Lt. C. A. H. Longcroft, Welsh Regt., and Lts. G. B. Haynes, G. T. Porter and C. T. Carfrae, all of the Royal Artillery. Dawes was the senior pilot; he received his R.Ae.C. Pilot's Licence on July 26th, 1910—it was only the seventeenth to be issued. Capt. Burke's R.Ae.C. ticket was No. 46, but before that he had qualified on the Continent and held Licence No. 260 from the Aero Club de France.

Though Burke was undoubtedly a great character and a great commander, records do not show him as a particularly skilled pilot. His name is bound up with his famous machine, the prototype B.E. biplane, a photograph of which appears in the heading of this history. It was an experimental tractor two-seater designed by Mr. G. de Havilland (now Sir Geoffrey) in 1911 and built at the Royal Aircraft Factory at Farnborough, forerunner of the R.A.E.

Despite the progress of military flying on the Continent, Britain was making a very slow start and no funds were available for building to new designs. Repairs and overhauls, however, represented legitimate costs and this first B.E. was actually created by the drastic reconstruction of a Voisin pusher, which had a water-cooled 60 h.p. Wolseley engine. The Voisin had been presented to the Air Battalion by the Duke of Westminster and sent to the Factory for repair.

When it emerged from Farnborough there was very little evidence of the original aircraft and Sir Geoffrey de Havilland remembers distinctly that the only parts used in addition to the engine, petrol tank and radiator were the lower wing-root fittings. These were there because at one stage it had been the intention to use the Voisin wings.

The first of a long series of B.E.s, this prototype had a lengthy and adventurous career. Burke took it with him from the Air Battalion to No. 2 Squadron, crashing it on sundry occasions. It was also used at Farnborough for experimental flying before finally being written-off in a crash in January, 1915.

The newly established R.F.C. was stationed at Farnborough and Salisbury Plain, and No. 2 was the first independent unit to be sent out to occupy a new station. This precedent was established when, in January, 1913, it moved by air, road and rail to new quarters at Montrose on the east coast of Scotland. Five of the officers flew all the way: Capt. J. H. W. Becke and Lt. Longcroft (Now A.V-M. Sir Charles Longcroft, K.C.B., C.M.G., D.S.O., A.F.C., R.A.F., RETD.) on B.E.s and Capts. G. W. P. Dawes and P. L. W. Herbert and Lt. F. F. Waldron on Maurice Farmans.

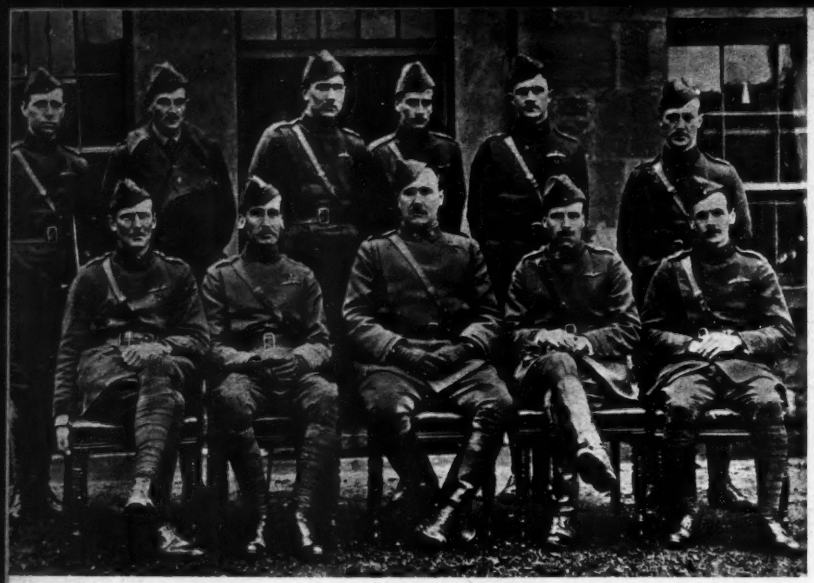
The following are extracts from an account of the journey which appeared in *Flight* at the time:—

"The first stop was to have been Towcester. Three of the pilots landing at Reading, while the others returned to Farnborough, the fog making it impossible to go forward. A fresh start was made on Monday, and Capt. Becke reached Towcester from Farnborough, after making a stop at Blakesley for petrol. Capt. Longcroft, who had started from Reading, landed about three miles west of Oxford. Lieut. Waldron, who started from Farnborough, came down at Port Meadow, Oxford, and Capt. Dawes reached Banbury. Lieut. Herbert started from Reading and landed at Moreton-in-the-Marsh. In each case a descent had to be made for petrol. On Tuesday, Lieut. Herbert went on a few miles to just by Banbury.

"On the 19th ult., Capt. Longcroft and Lieut. Herbert also got that far, while Capt. Dawes descended about two miles short of Towcester on account of engine trouble. Lieut. Waldron also had trouble with his motor, and finished at Bicester. The next day, Capts. Becke and Longcroft, and Lieut. Herbert went on to Kelham, near Newark, while Lieut. Waldron progressed as far as Towcester, where Capt. Dawes was engaged in repairing his machine. On the 21st ult., Lieut. Waldron went on to Newark, and after a brief stop to replenish

The aircraft in the heading are the prototype B.E. of 1911, No. 2 Squadron's first aircraft—with Mr. de Havilland inspecting the undercarriage—and two of its present day Spitfire 14s, flown by F/L. Maddox and F/O. Bell.

In heraldic parlance the squadron badge comprises "Three concentric circles over all a Wake knot." It is taken from the arms of the Hereward Wake family and the word Hereward, used as a motto, is a compound of Here meaning Army and Weard meaning Protector.



No. 2 Squadron pilots in 1914. Left to right, standing: Lt. Harvey-Kelly, Lt. Empson, Lt. Corballis, Lt. Noel, Lt. Rodwell, Lt. Mastyn. Seated: Capt. Todd, Capt. Dawes, Major Burke, O.C., Capt. Waldron, Lt. Dawes.

No. 2 Squadron . . . . . .

his petrol tank, etc., continued his journey to York. He was closely followed by Lieut. Herbert and Capt. Longcroft, while on the arrival of Capt. Dawes at Newark later in the day, Capt. Becke also started away for York. When nearing Doncaster, however, he had serious trouble with his engine and had to land. Capt. Dawes in stopping at Newark slightly damaged the chassis of the machine, and so had to stay there for repairs.

"Saturday saw three of the pilots, Capt. Longcroft and Lieuts. Waldron and Herbert, arriving at Newcastle-on-Tyne, but they found some difficulty in locating their destination on account of the thick fog. Capt. Longcroft went about 15 miles north of the city, and then had to land to find his direction, while Lieut. Herbert had to descend twice. Lieut. Waldron landed with the idea of discovering his whereabouts at Benwell to the west of Newcastle, and a mishap to the elevating gear prevented him finishing the three or four miles to Gosforth Park. Capt. Dawes started from Newark, but had to land after covering eight miles. A second descent was necessary three miles further on, while he finally landed twenty miles south of York. Capt. Becke on Monday having had a new engine fitted to his machine, moved from York to Newcastle, and arrived about twenty minutes after Capt. Dawes, who had had to come down once to find his way. Capt. Becke, however, found the fog very troublesome, and had to come down five times before reaching Gosforth Park.

"Tuesday saw Capts. Longcroft, Dawes and Becke and Lieut. Herbert completing the fifth stage, from Newcastle to Edinburgh, the landing in each case being effected near the Retford Barracks. Lieut. Waldron started on this stage but was stopped by engine trouble at Stamford Bridge, about 28 miles south of Berwick. After adjustments he started again during the afternoon and reached Berwick. On Wednesday he got away early and flew straight through to Montrose and was, in fact, the first to arrive there. After an interval Capts. Becke, Dawes and Longcroft arrived and were duly received by the Provost and Corporation, while Lieut. Herbert completed the journey during the afternoon.

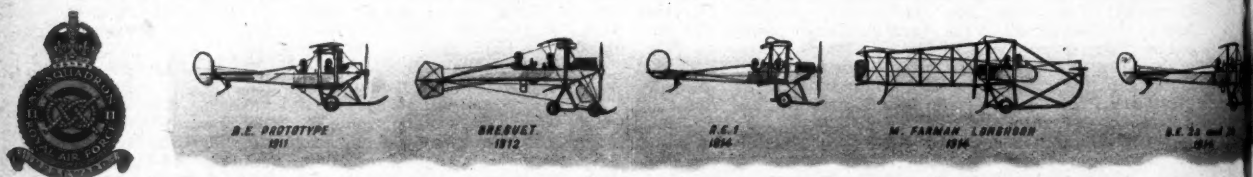
"The evening of the 25th saw four machines assembled at Edinburgh, while the fifth, Lieut. Waldron's Maurice Farman, was at Berwick. On the 26th, all the machines reached Montrose, Capt. Becke on No. 217 (B.E. type) accomplished the journey in 45 min. Lieut. Waldron made a non-stop flight from Berwick to Montrose. On the 27th and 28th all the officers of the squadron were out on their machines, exploring the country round Montrose."

From the foregoing it is evident that in those days long cross-country journeys were very hazardous, yet only seven months later Lt. Longcroft, with Col. Sykes as passenger, flew a B.E. with an auxiliary fuel tank from Farnborough to Montrose in 7 hr 40 min, with only one stop, at Alnmouth. The first part of this journey, 540 miles, constituted a world's record for a passenger flight. Later in the same year, flying solo, Longcroft flew from Montrose to Portsmouth, and then on to Farnborough, doing the whole journey non-stop in 7 hr 20 min.

In the autumn of 1913 the Squadron had an even more severe test when six aircraft of the unit took part in the Irish Command manœuvres. This entailed outward and homeward journeys of over 400 miles each, including a double crossing of the Irish Sea. The short crossing via Stranraer was taken, but, even so, the journey was extremely hazardous because of mist and rain and the absence of possible landing grounds. Navigation alone was a major problem, for the B.E. pilots' only aid were magnetic compasses of doubtful accuracy.

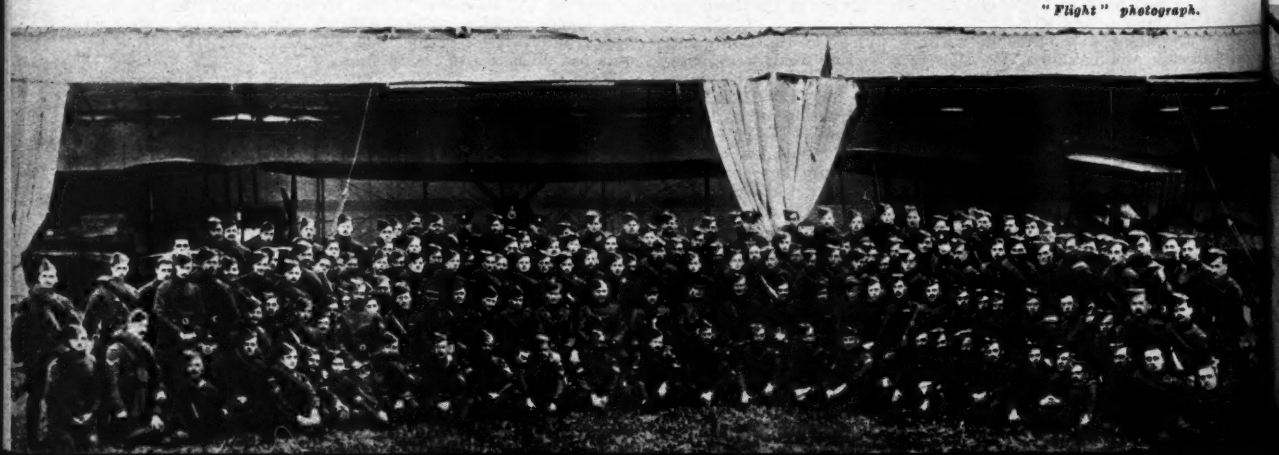
Despite all difficulties, the aircraft arrived in the exercise area and flew over 1,000 miles on reconnaissance without a single landing in "hostile" territory.

In June, 1914, the Concentration Camp of the whole R.F.C.



The complete unit—the men with greatcoats en banderole—at the Concentration Camp at Netheravon in 1914. In the centre is Col. Sykes, who commanded the whole Royal Flying Corps. In the background are the Squadron's B.Es. in their Piggott marquee hangar.

"Flight" photograph.



May 11th, 1914 : A B.E. of the Squadron starting from Montrose at 0530 hours on its long journey south to Netheravon.

was held at Netheravon and No. 2 Squadron flew down from Scotland. On the journey from West Hartlepool to York the aircraft ran into a thick bank of fog. Three were wrecked and one damaged in a forced landing, one of the accidents causing the deaths of Lt. Empson and his passenger, Air Mech. Cudmore. When the fog cleared Major Burke concentrated the Squadron at York and, after a week-end's halt, proceeded south again, arriving at Netheravon on the 30th.

The camp lasted the whole month of June. Mornings were devoted to flying trials and experiments; afternoons to lectures and discussion. Major Burke's contribution to the lecture series was "Notes on Aviation." Tactical exercises, reconnaissance, photography, balloon handling and co-operation with other arms were all practised. Rivalry between squadrons was intense, but records seem to prove that No. 2 Squadron had the more skilled pilots.

Just over a month later, with the great war imminent, the Squadron was again on its way south. Of the four squadrons which flew to France with the British Expeditionary Force No. 2 had the most difficult task. The pilots started south on August 3rd and the unit was at Dover, all set for the Channel crossing, by the evening of the 12th. Lt. Harvey-Kelly got away at 0625 hours the next morning and reached Amiens at 0820, the first R.F.C. pilot to land in a foreign country. (Harvey-Kelly was killed on April 29th, 1917, while commanding No. 19 Squadron. Leading an offensive patrol of three Spads, he attacked the famous Richthofen Circus; all the Spads were lost; but not before they had disposed of five of the enemy.)

A week after arriving in France the Squadron made its first war reconnaissances. They were flown by Major Longcroft with Capt. U. J. D. Bourke as observer, and Capt. Todd, who had Lt. Corballis with him.

On August 25th No. 2 achieved the distinction of driving down the first enemy aircraft, Lts. Mansfield and Harvey-Kelly attacking an enemy monoplane and forcing it to land. The occupants escaped into a wood, but the British pilots landed nearby, hoping to fly the captured aircraft back to base. Before they could do so, however, it was destroyed by a party of retreating British soldiers.

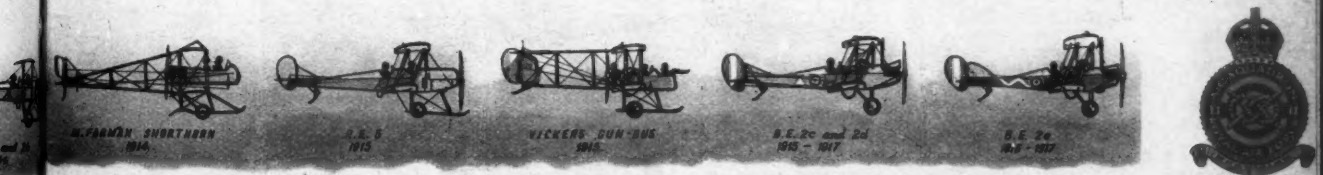
During the retreat from Mons the R.F.C. shared to some extent the experiences of the Army. It did not, of course, have to fight the terrible and wearisome rearguard actions, but airfields and bases had to be changed frequently while the aircraft had, at the same time, to be kept in flying trim.

In November, 1914, following the First Battle of Ypres, the R.F.C. was re-organized and the squadrons formed into wings. Major Burke was promoted to Lt. Colonel and given command of No. 2 Wing (Nos. 5 and 6 Squadrons) and Nos. 2 and 3 Squadrons formed No. 1 Wing. Major G. W. P. Dawes took over command of No. 2 Squadron.

During this early period of fluid and strenuous warfare the value of artillery co-operation had made itself very apparent. The greatest problem to be solved, however, was that of communication between aircraft and ground. Very pistols and signalling lamps had been tried with varying success, but during the Battle of the Aisne No. 4 Squadron had put in some very effective work with airborne wireless.

In February, 1915, a flight of wireless machines was allotted to No. 2 Squadron and in the Battle of Neuve Chapelle, which began in March, they proved invaluable.

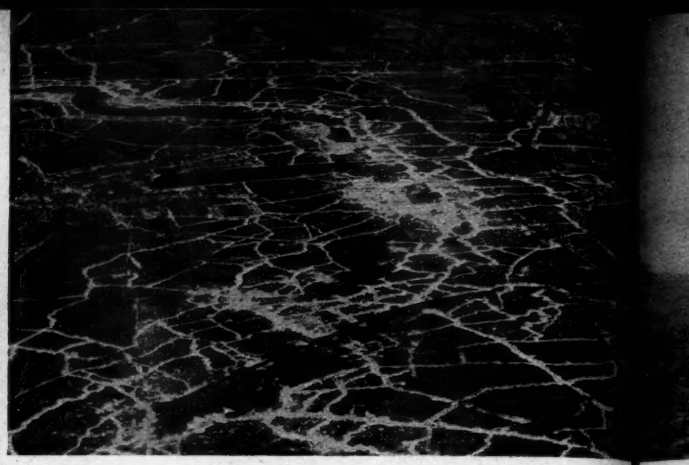
It was during the Battle of Neuve Chapelle, also, that the value of interdiction was shown to be so effective and a little later—in April, 1915, while the Squadron was on this work in the Second Battle of Ypres—the first air V.C. was won. Sec. Lt. W. B. Rhodes Moorhouse, an outstanding civil pilot before the 1914 war, was given as his objective in an interdiction sortie the railway junction at Courtrai, with the intention of stopping enemy reinforcements being brought up by rail. Coming down to less than 400ft he hit his target with a 100lb bomb. Being so low, he came under intense small-arms fire, particularly from the belfry of Courtrai Church. Immediately after dropping his



(Left) One of No. 2's original pilots : Lt. C. A. H. Longcroft, in civilian clothes, learning to fly on a Bristol Box-kite. His licence was number 192 and dated 5-3-12. (Right) More early starters : The ground party with their Leyland lorries ready at 0430 hours to start south for the Concentration Camp.

"Flight" photograph.

A B.E.2c of No. 2 Squadron at Hesdigneul airfield in 1916. Note the ground-type Lewis gun attached to the centre-section strut. The observer stood up to fire. (Photographs lent by Major Gould.)



Part of No. 2 Squadron's battle area in 1916. It was over this ground that the demonstration "shoot" was made for the Duke of Connaught. The opposing lines are so close as to appear inextricably mixed.

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bomb Lt. Moorhouse was badly wounded in the stomach, and his machine damaged; he was also hit in the thigh and hand. Despite these severe wounds he managed to pilot his aircraft back to his own airfield at Merville, a distance of 35 miles—in those days, some 35 or 40 minutes' flying. He landed, and before going to hospital, made out a full report. He died of wounds the next day and the award of the Victoria Cross was made posthumously.

Command of the Squadron had passed from Major Dawes to Major T. I. Webb-Bowen in March, 1915, and on June 2nd of the same year Major J. H. W. Becke took over; he had previously commanded No. 6 Squadron.

When the Battle of Loos opened on September 25th, 1915, No. 2 Squadron was stationed at Hesdigneul and had two flights reserved for counter-battery work and one for trench bombardment. They co-operated with the artillery over a front of three-and-a-half miles.

With increased air activity came the need for specialized Wings and Brigades, and No. 2 Squadron, together with Nos. 3, 10 and 18, became the 1st (Corps) Wing. With Nos. 18 and 27 Squadron, which formed the 10th (Army) Wing, they made up the 1st Brigade, attached to the 1st Army.

Command of the unit again changed, Major C. F. de S. Murphy succeeding Major Becke, and in April, 1916, Major R. A. Cooper took over.

We are indebted to Major Gould, M.C., who was "C" Flight Commander in No. 2 in 1916, for the following description of a "shoot" put on as a special demonstration for the Duke of Connaught. The targets, some German batteries concealed among ruined houses, had been agreed upon between Major Gould and the artillery commander. Fighter cover was provided by No. 25 Squadron, flying F.E. 2bs.

"On the appointed day and time," relates Major Gould, "we were awaiting the arrival of the Duke at the battery, flying backwards and forwards at a height of about three thousand feet, having called up and received the ground signal 'K.' ('Battery receiving signals but guns not ready to fire.')

"The Duke duly arrived with a train of four cars, stopping at the nearest point. He got out and walked up to the battery with several staff officers. I felt a bit squeamish about those four big staff cars, with their high black roofs, being in such a conspicuous position. If Jerry spotted them there would be trouble of a serious nature and we were only about 2,500 yards from the front line.

"I wheeled round over the battery just as the 'L' ground signal ('Ready to engage target') appeared and turned towards the target, sending down the 'AAA' ('Stand by'), then flew on until I was well over the four doomed houses. Looking back towards the battery, I now sent down 'GGG' ('Fire'). There was a colossal flash; I counted eight seconds and then saw a tremendous burst about 100 yards over the four houses. Turning round towards the battery again I expected 'Archie' to open up—as he usually did as soon as you turned—but nothing happened. 'B5' was my clock code to the battery —'100 yards over.' I again turned towards the target sending down the 'AAA,' flew on until I got a good view and then sent 'GGG' whilst looking at the battery. To my consternation there was no flash of the guns.

"'What's up now?' I muttered, and flew over to the battery, my observer pointing down frantically. The square signal was out, meaning 'Wait,' and to my further consternation I saw the Duke and his staff walk over to the cars and drive away.

"I learnt afterwards that the Duke, being an old gunner, had gone right down into the gun-pit to see the first shot fired and then moved off to some vantage-point to watch the shoot generally. How he could have stood the shock of the report from a sixty-pounder at his age—he was not far off seventy—passes my comprehension.

"After a short pause out came the 'L' again and away we went backwards and forwards, giving the 'Stand by,' 'Fire,' and then the correction by the clock-code system.

"The shooting was marvellous, with an O.K. at the third shot, brick dust and clouds of smoke rising into the air.

"Eventually 'Archie' joined in, and it was only by quick manœuvring that we managed to get away without anything more serious that a few jagged holes through the wings and fuselage. As soon as he switched off his Hymn of Hate I made straight for the battery again to give the Royal Salute according to instructions. Down we went in a steep dive, flattening out over the Battery Commander's H.Q. house—on which I left my aerial, having forgotten to wind it in. I

Installing an L.B.-type plate-camera in the fuselage of a No. 2 Squadron A.W. Atlas at Manston in 1930. On the ground can be seen the simple wireless set then in use. It was fixed to a detachable tray and the whole set could be removed in a matter of seconds. "Flight" photograph.

Major J. R. Gould, M.C., who commanded C Flight in 1916, with Capt. Chapman at Hesdigneul airfield. Although the aircraft seldom flew above 5,000ft, thick gloves and leather coats were wanted in the open, draughty, cockpits of the B.E.

pulled the stick back and jammed open the throttle so as to zoom up clear of the many chimney stacks around the coal fields in that district, but to my horror the engine choked and no revs. came. I shoved the nose down into a glide, prepared to land right in among the wrecked houses. Just before flattening out, however, the engine spluttered and on came the revs. full. Chimney stacks rushed at us from all directions as we banked and twisted to avoid collision, eventually emerging at the far end of the town. There was a strange whiteness around the observer's gills as he looked round from his front seat with a kind of screwed-up expression."

The B.E.s had done a wonderful job but they were dreadfully out of date by April, 1917, when No. 2 began to re-equip with the Armstrong-Whitworth F.K.8. On the new machines, instead of being at the mercy of every German fighter, they occasionally were able to fight back with successful results.

In addition to "art. obs.," photography and reconnaissance, bombing by both day and night became an important part of the squadron's work. The intensity of these duties is shown by the raids carried out during night-and-day operations on October 30/31st. During the night 39 x 20 lb bombs were dropped on Henin Lietard and Billy Montigny, and in conjunction with a daylight raid by the 46th Infantry Division the Squadron dropped 3 x 112 lb H.E., 20 x 40 lb phosphorus and 63 x 20 lb H.E. bombs in the front and on the flanks of the objective. The attack finished with the firing of 1,200 rounds of .303 into enemy communication trenches.

During the final German offensive in March, 1918, the Squadron won its second Victoria Cross. It was awarded to 2nd Lt. MacLeod for his gallantry whilst on a special low-flying patrol with Lt. A. W. Hammond, his observer. The citation reads:—

"Whilst flying with his observer (Lt. A. W. Hammond, M.C.), attacking hostile formations by bombs and machine-gun fire, he was assailed at a height of 5,000ft by eight enemy triplanes, which dived at him from all directions, firing from their front guns. By skilful manœuvring he enabled his observer to fire bursts at each machine in turn, shooting three of them down out of control. By this time Lt. MacLeod had received five wounds, and whilst continuing the engagement a bullet penetrated his petrol tank and set the machine on fire.

"He then climbed out on to the left bottom plane, controlling his machine from the side of the fuselage, and, by side-slipping steeply, kept the flames to one side, thus enabling the observer to continue firing until the ground was reached.

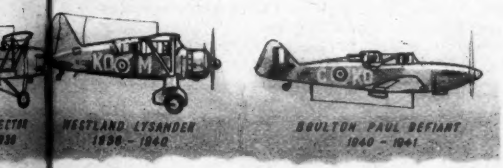
"The observer had been wounded six times when the machine crashed in 'no man's land,' and 2nd Lt. MacLeod, notwithstanding his own wounds, dragged him away from the burning wreckage at great personal risk from heavy machine-gun fire from the enemy's lines. This very gallant pilot was again wounded by a bomb whilst engaged in this act of rescue, but he persevered until he had placed Lt. Hammond in comparative safety before falling himself from exhaustion and loss of blood."

Command of the squadron had again changed in August, 1917, when Major Snow, M.C., took over, and he handed over the reins to Major P. G. Ross-Hume a year later.

In the final advance No. 2 kept up its pressure on the enemy. Though the work of Army co-operation was so vitally necessary, the Squadron could not, of course have any spectacular scoreboard of "kills" to show for over four years unremitted labour and courage. Its casualty figures, however,

COMMANDING OFFICERS *(In chronological order)*

Major C. J. Burke.	S/L. F. W. Stent.	S/L. W. A. Opie.
Major G. W. P. Dawes.	S/L. A. J. Butler.	W/C. A. J. W. Geddes.
Major T. I. Webb-Bowen.	S/L. L. E. Forbes.	W/C. P. J. A. Riddell.
Major J. H. W. Becke.	S/L. R. E. Saul.	W/C. P. W. Stansfield.
Major C. F. de S. Murphy.	S/L. W. Sowrey.	S/L. B. Egan Wyer.
Major R. A. Cooper.	S/L. H. M. Probyn.	S/L. C. E. Maitland.
Major W. R. Snow.	S/L. S. E. Toomer.	S/L. R. J. F. Mitchell.
Major P. G. Ross-Hume	S/L. P. F. Fullard.	S/L. D. W. Barlow.
S/L. B. F. Moore.	S/L. J. H. Green.	S/L. G. Collinson.
	S/L. N. L. Desoer.	S/L. W. A. Newenham



An Armstrong Whitworth Atlas picking up a message by means of a retractable hook carried beneath the fuselage. The message was slung between two short posts. This method was last used in the Hawker Audax.

Lt. W. B. Rhodes Moorhouse, who won for No. 2 Squadron the first air Victoria Cross. He is standing before the Bleriot monoplane which he flew before the 1914 war. His R.Ae.C. Licence was No. 147, issued on 17-10-11. "Flight" photograph

Changeover : This photograph was taken at Sawbridgeworth in July, 1942, when the Squadron was equipped with both Mustangs and Lysanders. The Mustang carried six 0.5in Browning machine guns.

An unusual event for an army co-operation unit : Squadron formation in the new Mustangs in July, 1942. For A.-C. work it is seldom necessary for more than two aircraft to fly together.

No. 2 Squadron . . . . . .

are a vivid testimony; they included 20 killed or died of wounds, 19 missing, 51 wounded, 12 prisoners of war, 3 accidentally killed, 14 accidentally injured.

In February, 1919, the Squadron was reduced to cadre and returned to England, being disbanded at Weston-on-the-Green. It was revived in 1920 as part of the R.A.F. Command in Ireland. Headquarters were at Oranmore, Co. Galway, and one flight was at Castlebar, Co. Mayo, and another at Fermoy, Co. Cork. Its aircraft then were Bristol Fighters.

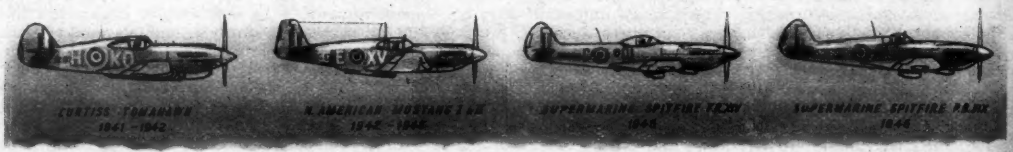
After serving in Ireland for some two years the unit returned to England and was stationed at Digby, but its stay there was of short duration; three months later it was back in Ireland, at Aldergrove, Ulster. Two flights returned to England in September, 1922, but the remaining flight continued on detached duty in Ireland until February, 1923, when it returned to England and rejoined the remainder of the Squadron at Farnborough. Almost exactly ten years from the day when the Squadron left Farnborough to lead an independent existence, it was back there again.

Except for a short spell, from April to October in 1927, when it went to Shanghai to supplement the R.A.F. unit in H.M.S. *Hermes*, and to co-operate with the Shanghai Defence Forces during the disturbances there, No. 2 Squadron did not go abroad again until the outbreak of the 1939-45 war.

The first available records of the Squadron's second war-period start at Abbeville in April, 1940. The "phoney war" was nearing its end, but few realized it, and such feats as that of L. A/C. J. E. Humphreys in winning the R.A.F. Component Cross-country Race from a field of 150 seemed the most important thing imaginable in Squadron affairs. The rude awakening came on May 10th, when 75 enemy bombs fell on the airfield, though fortunately without causing damage or casualties.

In the turmoil of the Blitzkreig, various moves were made to and from airfields in Belgium and the first casualties were reported on May 17th. Four Tac.R. (Tactical Reconnaissance) aircraft were sent out to report on the progress of a German armoured column on the Cambrai road. P/O. C. H. Dearden and A/C. Patterson in Lysander K.O.-N failed to return. Dearden turned up the next day and reported being attacked by nine Me. 109s and escaping by diving to ground level and landing at Douai—with 32 holes in his fuel tank. Patterson, left to look after the Lysander, set fire to it to prevent it from falling intact into German hands.

On May 19th a main air party left for Lympne and road parties made for Boulogne, where they arrived the next day. Back in England, No. 2, after various moves, settled in at Bekesbourne. From there, Tac. R. and bombing raids were made, and on May 27th, during the epic stand of the beleaguered garrison in Calais, eight of the Squadron's aircraft flew-in supplies of water, ammunition and food. The containers had to be dropped in a very restricted area in the Citadel and, to make certain, the Lysanders came down to 50ft. Only one container went outside the target area.



Invasion alerts were brought into force and personnel recalled from leave.

In June, 1941, work was started on extending Sawbridgeworth airfield in readiness for the replacement of the faithful "Lizzies" by Tomahawks. The first of the new aircraft was collected from the Cunliffe Owen factory on August 28th. There was considerable trouble at first with ground looping and bevel gears failing, and for a while the Squadron was flying a mixture of Lysanders and Tomahawks.

Eleven months later there was another change of aircraft, this time to Mustangs, the first four being collected from Speke on April 20th, 1942.

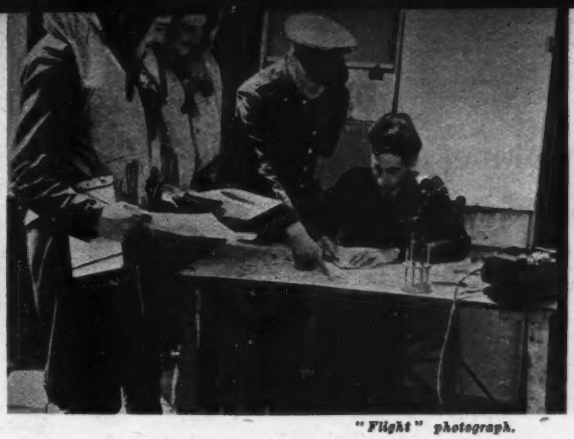
Exercises of all sorts were continually being carried out. They rejoiced in such code-names as Bumpers, Tobruks, Sappers, Foot, Chenies, Simplex, Tiger, Blitz, Filter, Falcon, Bullets, Lively and Crack. The liaison between the Army and No. 2 was impressive—each got to know the other fellow's weapons and tactics. As the plans for the invasion of France began to develop the Squadron started co-operating with the battle-training schools, using live ammunition over the heads of the troops.

November, 1942, saw the Squadron back on "ops," taking oblique photographs of R.D.F. stations on the Dutch coast and doing oblique line overlaps of the Continental coast. At this work the pilots had to go as far north as Bergen in Norway. All accounts show the extreme patience used to get the required information and photographs.

The system used for Tac.R. sorties was for the Mustangs to fly in pairs, the rear man looking after the front man's tail so that he could concentrate on the reconnaissance. Casualties were not high, but occasionally there was a bad patch. For instance, on May 3rd, 1943, when leaving on an offensive patrol against rail movement in the Rennes area, the formation ran into a wall of sea fog at St. Albans Head. The leader gave orders for the formation to climb but, unfortunately, F/O. Hirst, F/O. Miller and P/O. McLeod failed to clear the hill, which was cloaked by the fog, and were killed.

In June, 1943, the Squadron moved first to Gravesend, then

"Flight" photograph.



"Flight" photograph.

(Left) Capt. D. L. Rowlands, R.A., the present Army Liaison Officer, checking photographs against a map. (Centre) W/C. P. J. A. Riddell, with his A.L.O., briefing pilots in 1942. (Right) The present C.O. S/L. Newenham, D.F.C., in front of his Spitfire 14.

to Odiham (the pre-war home of No. 13 Squadron, another famous Army Co-operation unit) and on to North Weald, but it was there for only a fortnight or so before going back to Sawbridgeworth. Fewer operations and more training was then the order of the day, but on January 6th, 1944, the first "No Ball" (attacks on V.1 launching platforms) sortie was flown.

A reconnaissance typical of the time was that flown by F/L. Rechil and F/O. Varley. They crossed the enemy coast near Baie d'Authie at nought feet and flew on to Bernay, where intense and accurate flak was encountered. Flying on to Plessin, No. 1 was hit in the starboard wing but continued on to the target. Here twelve Me.109s were seen, so the pair retired to the eastward and returned five minutes later to make three runs over the target at 2,000ft. On the way home a further twelve 109s were seen, circling an airfield south of Abbeville. The coast was recrossed north of Ault.

The Squadron flew 36 sorties on D Day, mostly on naval-bombardment spotting. No fewer than seven pairs were operating between 5 a.m. and 6 a.m. on that momentous day. D Day plus 1 saw the pilots back to normal duties, watching and photographing all enemy movement; casualties increased slightly.

The first pilot of the Squadron to touch-down in France after D Day was F/O. R. G. West, who landed on the newly made airstrip because of fuel shortage. With F/L. J. H. Hazelden (later missing), he had been on a Tac.R. to the railway sidings at L'Aigle and Verneuil.

On July 29th, 1944, No. 2 went to France for the third time in its 32 years' existence. Landing was made on airstrip B10 at Plumetot. Duties consisted almost entirely of Tac.R. sorties, but the Squadron's chronicles observe that "Everyone seems to be reasonably happy and to have very few grouses"—presumably they had objected to remaining in England. That work was hard and intense there is no doubt. In August alone, for instance, the unit flew 326 operations,

No. 2 Squadron, 1949. On the left are the "A" Flight Spitfire 14s and, on the right, the P.R. Spitfire 19s of "B" Flight. The pilots in front are left to right, F/Os. A. C. Bavin, J. C. Dargan, C. S. McDonald, J. L. Towler and P. J. Abrey; F/Ls. J. L. Bayley, D. A. Maddox ("A" Flight Commander) and R. Woodhouse ("B" Flight Commander); Capt. D. L. Rowlands (A.L.O.); F/L. P. P. Palmer; and Plts. Il P. J. Harrington, C. R. Blackwell and F. Devrell. F/O. B. C. Bernard-Smith is standing behind on the right.

"Flight" photograph.

No. 2 Squadron . . . .

with an average of two pilots taking part in each of them.

In September the advance became faster and moves were made to airstrips B27 (Boisney), B31 (Fresnoy Folny), B43 (Fort Rouge) and B61 (St. Denis Westrem), where the Squadron was accommodated in houses for the first time since landing on the Continent. The area now under surveillance was St. Omer, Boulogne, Bruges, Ghent, Antwerp and Flushing, and right up to Rotterdam and Tilburg.

A change of aircraft came towards the end of 1944. The faithful Mustangs were replaced by Spitfire 14s and the first recce on the new aircraft was flown by the C.O., S/L. Maitland, D.F.C., and F/L. West. They covered the area Hollandschdiep, Rotterdam, Breukelen and Drimmelen.

As the winter of 1944-45 receded, the attentions of the Squadron became focused on the area where the Rhine was to be crossed—Bocholt, Wesel, Venlo, Xanten and Emmerich. To relieve the monotony the pilots were able, also, to have an occasional crack at the flying bombs with which the Germans were then attacking Antwerp.

Further moves had been made, and on March 9th No. 2 joined Nos. 4 and 268 Squadrons at airstrip B89 (Mill). Nine days later the Commanding Officer, S/L. Maitland, was killed in the Emmerich-Elten area. Maitland dived through some cloud and was last seen surrounded by intense flak.

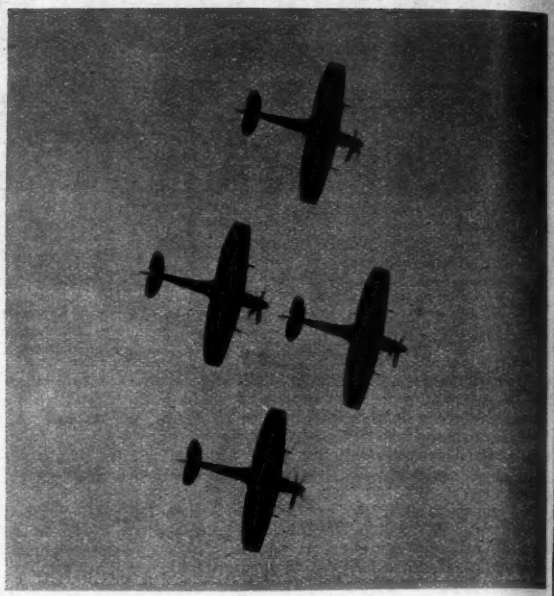
At the Rhine Crossing

The beginning of the end of the war became apparent with the crossing of the Rhine on March 24th, 1945. On that day the Squadron's duties were concerned with mostly flak spotting. A typical report gives a fairly clear picture of the scene. F/L. C. D. C. Dunford Wood, D.F.C., and F/O. N. F. Bowen reported that smoke on the ground obstructed observation. (This is not surprising, for some 1,200 guns had kept up an intense barrage for over 17 hours.) They observed no gun flashes on the enemy side of the river, though numerous bursts of 88 mm and 40 mm were to be seen. Flak interference with our airborne forces appeared moderate to intense. We lost some 51 aircraft.

Another pair, F/L. M. J. Chun and F/O. J. A. Henderson, A.F.C., operating about midday, reported more than 100 Hadrian gliders along the Autobahn and movement of our own troops along the road.. Over 1,000 parachutes were to be seen and in one area 30 gliders were observed casting-off to land, while a further 80 were arriving. Troops could be seen crossing the Rhine from west to east.

On April 18th, 1945, the last war move was made—to B106 at Twente/Enschede in Holland. Mill with its sand, Nissen huts and "a strip that was never into wind," was left without any regrets. Accommodation at Twente was in permanent buildings in pleasant surroundings, and from here the final sorties were flown before the surrender of the German forces on May 5th.

For a squadron doing photo-reconnaissance peace means merely less risk. There is always the same amount of work to do, and through the difficult period of demobilization the members of the Squadron, both pilots and ground crews, have had a very strenuous time. It is probably because of this full



That an army co-operation squadron is able to fly a good formation is proved by this picture of four of No. 2 Squadron's Spitfire 14s of "A" Flight.

occupation that No. 2 has remained such a splendid and keen unit.

The structure of the Squadron was changed in 1946 to a two-flight basis. Six pilots and six high-altitude Spitfire 19s had been posted from No. 4 Squadron (which then became a fighter-bomber squadron), and they formed B Flight, occupied solely on photo-reconnaissance. The Spitfire 14s became A Flight and their duties, exclusively on tactical reconnaissance work, remained the same.

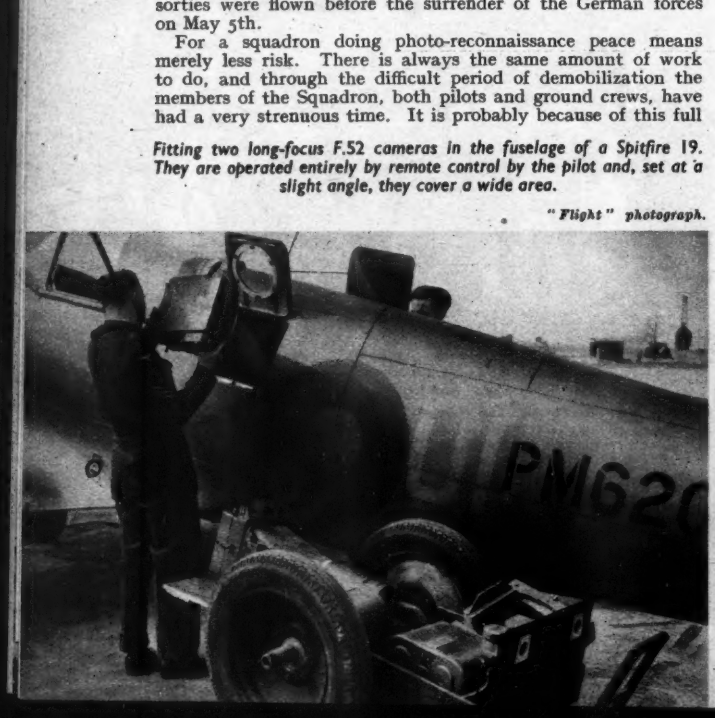
The present C.O., S/L. W. A. Newenham, D.F.C., was in the R.N.Z.A.F. until last March. He came over with the first navigators' course and did two tours of operations as a navigator before 1942—the first with No. 77 Squadron on Armstrong Whitworth Whitleys and the second on Wellingtons with No. 405. He was with No. 485 Squadron from November, 1943, to March, 1945, and after a Staff College course did nearly three years at the Air Ministry.

Group Capt. D. J. Eayrs, C.B.E., D.F.C.

Curiously, the commanding officer of the station from which the Squadron is now operating, G/C. D. J. Eayrs, C.B.E., D.F.C., is an old No. 2 Squadron officer. He was with the unit at Manston in 1928 and was in the last flight to fly the Bristol Fighters left over from the 1914-18 war.

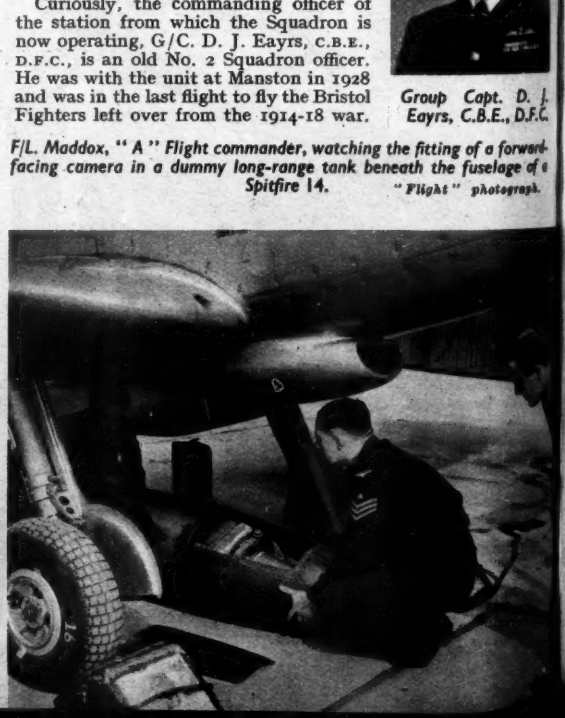
Fitting two long-focus F.52 cameras in the fuselage of a Spitfire 19. They are operated entirely by remote control by the pilot and, set at a slight angle, they cover a wide area.

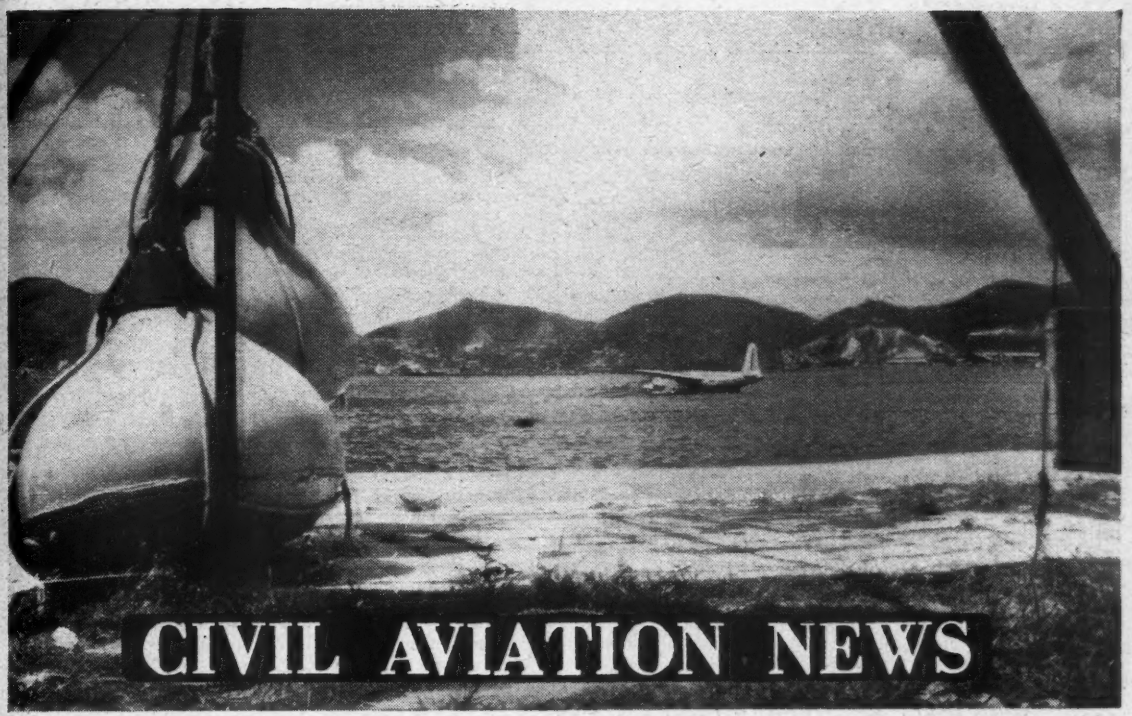
"Flight" photograph.



F/L. Maddox, "A" Flight commander, watching the fitting of a forward-facing camera in a dummy long-range tank beneath the fuselage of a Spitfire 14.

"Flight" photograph.





CIVIL AVIATION NEWS

ISLAND TERMINAL : A B.O.A.C. Plymouth flying-boat moored off Kai Tek, at Hong Kong. This type operates a service on Thursdays and Saturdays between Southampton and Hong Kong and also a shuttle service between Singapore and Hong Kong.

Viscounts for B.E.A. : Clubs' Protest : Practical I.A.T.A. Suggestions

B.E.A. AND THE VISCOUNT

NEARLY 18 months ago British European Airways ordered Ambassadors in quantity to replace the Viking fleet. This decision was surprising, for it followed some two years of close co-operation with Vickers in the design stage of the Viscount. Subsequently the Viscount flew and has since been acknowledged as a highly efficient transport aircraft, well ahead of its time. Now it is said that B.E.A. are again thinking of buying some Viscounts, to supplement the Ambassador fleet and for use on short-stage services. At first this may seem to be a flagrant change of mind in a very short time, but the effect of such an order on British prestige must be considered. The Corporation has doubtless been influenced by more favourable operational figures presented by Vickers; this would be understandable, since the Type 700, powered by more powerful Darts having considerable air experience behind them, must be a better commercial proposition than was the earlier Viscount.

The main objections to the further order would be concerned with the air traffic situation over Europe, which has not altered appreciably since the time when disappointing post-war progress in traffic control was given as the reason for not operating turbine aircraft. Also, Rolls-Royce are heavily committed to producing turbojets for military aircraft and might possibly find that a sizable production order for civil Darts would prove embarrassing. Moreover, the operation of several types of transports is a well-worn Corporation excuse for heavy financial losses. Nevertheless, the decision should be welcomed, for it is only by developing such an advanced civil airliner on our own routes that foreign interest will be aroused sufficiently to create a market overseas, and the operation of turbine aircraft for the first time by British airlines must unquestionably raise the prestige of the industry.

AIR CHARTER

THROUGHOUT the month of May there was more activity in the air-freight market than at any time since the beginning of this year. Aircraft were operating at high intensity and return loads on many flights permitted low rates to be quoted in both directions. Fruit traffic has dwindled recently and the rates offered by charterers were so low that British operators were unable to compete.

Large consignments of radio sets have been flown to Cairo, materials have been flown to Nairobi, refrigerating equipment to Paris, penicillin to Milan, machinery parts to Vancouver and nylon stockings to Barbados. These are representative of the shipments now being made by air, and other enquiries for the transport of a large range of goods show that still further interest is being taken in the possibilities of air transportation.

A.B.A.C. RESOLUTION

AT the annual general meeting of the Association of British Aero Clubs and Centres, Ltd., on May 30th, the following resolution was passed: "That the Association of British Aero Clubs and Centres in general meeting deplore the Government's short-sighted policy of starving the flying clubs of any form of support. The flying-club movement made a major contribution of pilots and trained ground personnel to the Royal Air Force and Fleet Air Arm during the early stages of the war, and the present negative policy of the Government makes it impossible for the clubs to continue with the work of training pilots and ground personnel drawn from the younger generation who, as in the past, would form a major cornerstone of our national defence. We therefore call upon the Government to formulate a policy for the utilization of the facilities provided by the flying clubs before it is too late."

During the meeting it was made clear that in all negotiations with Ministries contracts had been sought in connection with the training of, or refresher courses for, persons who would be of use in national defence. A subsidy, it was pointed out, had not been asked for. Since the war the association had based its organization on the need to integrate its methods as closely as possible with those of the Service. R.A.F. officers sat on the association's technical and pilotage committees and the members' servicing standards approached those of the Service within the limitations of the civil airworthiness requirements. The association's training syllabus followed that of the R.A.F. and much training information had been made available to the members by the Air Ministry. The R.A.F. sented by the Air League and the training for which was carried had recognized the value of scholarships for air cadets pre-out at air centres.

Members stressed the difficulties in private flying, particularly for young people. Clubs were flying fewer hours and costs were rising, through no lack of efficiency. The cost per aircraft per hour before the war was about £3, whereas now

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it was between £4 and £4 10s. It was emphasized that the new regulations for student and private pilots' licences imposed no greater hardship upon would-be pilots.

Mr. G. H. Miles, the chairman, thought that assistance would be forthcoming, but he hoped it would be made available before all the clubs had disappeared and some £100,000 was necessary to keep the movement going. It would then be possible to provide a nucleus of engineers and trained flying instructors available in the event of an emergency; and women A.T.A. pilots and ex-Servicemen would be able to keep their hand in for non-operational flying duties. Moreover, the private aircraft industry would be encouraged. It was obvious from other members that the clubs were losing money and were spending capital, and the more hours they flew the greater the loss. It would be necessary, the chairman said, to have some support in the form of training schemes to spread overheads and reduce costs.

THE FIRST BALTAIRVOY

ON Wednesday, June 1st, Mr. Eric Rylands, as chairman of the British Air Charter Association, received from Mr. J. Beeson, of E. A. Gibson, Ltd., the first Baltairvoy charter party ever concluded. With the permission of the three parties, British Nederlands Air Services, Ltd.; Glaxo Laboratories, Ltd., and E. A. Gibson, Ltd., the brokers, the framed document was presented to the Charter Association as an historic memento of the occasion. The contract was for carrying 3,400 kg of penicillin to Milan. The charter party is a balanced contract between the charterer and the owner, imposing equal liability upon each. It is understood that it may be adopted by operators on the Continent and also in the U.S.A.

SPRAYING BY HELICOPTER

A SPECIAL system of spraying by pressure from air bottles has been adapted to a Westland Sikorsky S.51 helicopter by Pest Control, Ltd. The air bottles are placed on an outrigger extended in the front of the helicopter, and this arrangement, incidentally, helps to maintain the correct c. of g. without the use of ballast aft.

The tank carrying 85 gall. of D.D.T. emulsion is of stainless steel and feeds to a spray bar aft of the pilot; on the bar can be placed any number of nozzles up to 100. The spraying pressure, which is governed by the flying height and the crop being sprayed, is controlled by the pilot at the control column. The width of a single spraying flight is 60ft and the speed may range from 15 to 35 m.p.h. according to the crop. The height at which the operation is at present being carried out also varies, from 2ft to 15ft, depending again on the crop and the degree of penetration required.

During present spraying operations in the Cherbourg Peninsula the company is using supply tankers, on a shuttlecock system to base, to refuel the helicopter every 10 to 20 minutes. Each tanker is equipped with fuel, replenished air bottles, oil and spraying chemical, and the refuelling operation takes only two minutes. In the same operation French helicopters are using dust, but this has not been found as satisfactory as the British emulsion, which has proved 100 per cent effective.

I.A.T.A. OPERATIONAL RECOMMENDATIONS

THE third annual International Air Transport Association Technical Conference ended at Burgenstock, in Switzerland, on May 29th. Some 150 representatives of 27 member-airlines, international organizations, communications agencies and other groups took part. Special lectures were given on new navigation and landing aids, helicopter services, pilot-fatigue problems and on an analysis of the air traffic control, maintenance, and ground handling procedures of the Berlin airlift. The DC-6 was the subject of a lengthy discussion.

The AIDS Working Group estimated that while 300 airports were equipped with approach lighting systems, at least 1,400 others should have similar facilities. The Conference favoured either left-side-line or centre-line systems for low-intensity lighting used in ordinary night landing, and either the slope-line or Calvert systems for high-intensity bad weather approach lights. With the introduction of high-speed and high-altitude aircraft the present aeronautical charts were considered inadequate and the Group has asked Governments to prepare a new series of 34 route charts covering all the major world air routes, to a recommended scale of 1: 2,000,000.

New ground-handling problems brought about by double-decker aircraft and jet transports were also discussed, and it was thought that new towing equipment, and sloping runways to allow taxying without the use of engine (to avoid strong airscrew blasting, or, in jet aircraft, high fuel consumption at idling speeds) should be studied. The Communications Working Group proposed a strengthening of the I.A.T.A. regional communications committees for working on the navigation and communication problems along the routes.

During the next year, it was stated, I.A.T.A. members would analyse new "rationalized" performance-requirements for large and small passenger-transport aircraft to determine what unnecessary performance margins in aircraft could be eliminated. It was thought that the findings would indicate the way to considerable increases in available payload, and they would be reported at a special meeting in the autumn of 1950. In this direction, particularly, I.C.A.O. and I.A.T.A. had co-operated very closely.

The Engineering Group had combined British symbols and American colour-codes in a new uniform system of marking internal leads in aircraft. It was considered that the new method would be virtually proof against misunderstanding and occasional colour-blindness. The fittings used on tractors for towing aircraft on the ground were also standardized, as was the format of maintenance manuals issued to airline personnel by manufacturers.

On the operational side the influence of better landing aids was making it possible, it was thought, to reduce the official weather minima which determined the possibility of landing at airports. The Conference recommended that I.C.A.O. should be asked to change both the concepts and the details of its present standards on the subject. Mr. W. H. Thompson, of B.E.A., chairman of the OPS Group, explained that it was now possible to abandon the concept of strict visibility and ceiling and to use instead the idea of "critical height," which was the altitude at which instrument approaches should be abandoned if the ground could not be seen. The Group also recommended a special I.A.T.A. study of a possible reduction in this critical height.

The Conference asked for an early implementation of the rule of 500 feet separation between traffic levels and, as a supplement, endorsed the eventual use of a flight-level indicator by airline aircraft; Governments and manufacturers were asked to study desirable characteristics for such an instrument as an urgent requirement.

On the recommendation of the OPS Group, the Conference asked I.C.A.O. to tighten the requirements for position-reporting procedures of aircraft flying in QBI. It also asked for regular meteorological reports between air and ground to be reduced to a strict minimum to avoid overloading the air. Certain suggestions were made with regard to weather, and a

OVERLORD II: Attacking the Colorado beetle menace in the Cherbourg Peninsula, Pest Control, Ltd., using a Westland Sikorsky S.51 manufactured in this country, are spraying some 6,000 acres of potatoes in the neighbourhood of Caen.

CHARTER CONTRACT: The first contingent of visitors to British war graves in Italy left Bovingdon for Rome last month. The contract covers well over 200 flights, which will be arranged on a daily basis until the beginning of July, when the frequency will be doubled. Twenty-four-seater Vikings are being used by Hunting Air Travel, Ltd., and the round trip takes four days, allowing two days at the destination.

discussion took place on the future requirements for stratosphere weather-reporting:

It was also recommended that the fuel reserve regulations be changed to provide adequate supplies to sustain 45 minutes' cruising speed after an aircraft arrived over its destination or the alternate airfield.

Dr. W. S. Frederik, of K.L.M., suggested new methods of evaluating aircrew performance, particularly with regard to fatigue. Present methods based on flight time limitations may, it appears, be replaced by a performance unit designed to allow for the type of equipment flown, the conditions of operating and the kind of crew.

Mr. N. E. Rowe, Director of Long-Term Development in B.E.A., forecast helicopter mail and local passenger services in Great Britain within four years. Experiments had proved that daytime regularity was high and that night services were fairly reliable. Operating costs were high at present, but he thought that within four years they would be reduced to the point where services could be commercially practicable.

Reports on the Decca navigation system and ASV 23, a new French instrument-approach system, were given by G/C. E. E. Fenessey and by Dr. H. Gutton and M. Ponty respectively. The 1950 I.A.T.A. Technical Conference will be held in the United States.

BREVITIES

NICE AIRPORT, hitherto known as Terrain de Californie, has now been renamed Nice-le-Var. The airport is about six miles outside the town and is used by B.E.A., Air France, Sabena, Alitalia and S.A.S.

* * *

American Overseas Airlines have been awarded the U.S. National Safety Council's 1948 aviation safety award for flying 389,000,000 passenger-miles safely between October 3rd, 1946, and the end of 1948. During this period A.O.A. carried 149,000 passengers and crossed the Atlantic 4,200 times. American Airlines, the parent company, has also been awarded a safety award for flying 2,933,272,000 passenger-miles without loss of life between December 28th, 1946, and the end of 1948.

* * *

Before the Olympic Games take place in 1956, Australia will develop Essendon Airport to be capable of handling jet-aircraft and the heavy traffic expected for the Games. Other Australian airports will be similarly equipped to accommodate jet aircraft. During 1948 Essendon's arrivals and departures totalled 58,370 radio-equipped and 98,486 others—more traffic than any other Australian airport. Passengers handled in 1948 were 752,655—55 per cent of the total carried by all Australian airlines, two-thirds of the freight and just half the air mail.

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To prevent undue temperature-rise in the cabins while loading, United Air Lines' 39 DC-6s are to have the tops of their fuselages painted white. Reflection of sunrays from a surface so treated is said to result in cabins being as much as 15 deg cooler than would otherwise be the case, while the preservative qualities of the paint more than offset the cost. LAMSA, the Mexican subsidiary of U.A.L., recently painted its entire fleet in this way and increased passenger-comfort has been reported.

* * *

Schedules on the internal Welsh service were revised on May 30th to provide a flight each week-day between Liverpool and Cardiff; the timing makes it possible for passengers from Liverpool to make the return journey the same day, allowing 5½ hours in Cardiff. On Mondays, Wednesdays and Fridays the service flies Liverpool-Hawarden-Cardiff, Cardiff-Hawarden-Liverpool-Valley. On Tuesdays, Thursdays and Saturdays the service starts at Valley and flies Liverpool-Hawarden-Cardiff, Cardiff-Hawarden-Liverpool.

* * *

Malayan Airways, Ltd., propose to start a weekly service linking Singapore with Sarawak and British North Borneo. A proving flight was due to leave on June 1st for Kuching, Labuan and Jesselton, and the new service is expected to be inaugurated shortly. The DC-3 aircraft, it is proposed, will leave Singapore on Mondays and return on Tuesdays.

Bookings already made in Canada for flights to Britain during this summer indicate that a record number of Canadians will visit Britain. B.O.A.C. have already booked 75 per cent of their June flights from Canada to Britain and 60 per cent of their July flights.

* * *

S.A.S. is offering special facilities for parties of passengers flying between Europe and South America. With a party of five, a sixth passenger may be considered as the tour conductor and fly at 50 per cent of the normal fare. For a party of ten, an eleventh passenger is considered as the tour conductor and travels free.

* * *

Construction of an international airport was recently commenced at Caselle Torinese, about six miles from Turin. It is hoped that the new airfield will be completed by the autumn. The first runway to be built will be one and a quarter miles long and nearly 200 yards wide.

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Seven B.E.A. pilots have been promoted captain 1st class; they are: C. E. F. Riley, A.F.C.; G. H. G. S. Rayer, O.B.E.; G. T. Greenhalgh, O.B.E.; W. B. Caldwell, O.B.E.; J. B. H. Pugh, O.B.E.; W. Baillie, A.F.C.; and E. W. Jordan. This distinction is awarded to captains for good service to the Corporation and outstanding qualities as pilots in command of aircraft.

* * *

An Air Ceylon Skymaster on a flight to Sydney was recently detained at Darwin because, it was alleged, the flight had not been authorized before leaving Ceylon. No accommodation for passengers was available, however, and since there was no alternative to their having to spend the night in the aircraft, permission was eventually given for the flight to be continued. An agreement for reciprocal rights between the two Governments has not yet been reached and the recent delegation from Ceylon is understood to have criticized the attitude of the Minister for Air in Australia. Air Ceylon business in Australia is conducted by A.N.A., the Australian independent company.

* * *

Representatives of Trans-Canada Airways are at present discussing with the U.S. State Department, the Civil Aeronautics Board and several airlines the possibility of the Canadian line picking up more passengers in the U.S. They are also trying to reach a bilateral agreement on the use of the Gander Airport, Newfoundland, which is now in Canadian territory. At present six American airlines cross the border at nine points, while T.C.A. enters the U.S. at only four, and the Canadians

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want to have stops along the East Coast for flights to Bermuda, Nassau and the West Indies. They suggest they should be allowed to stop at Boston, New York, Philadelphia, Washington and Jacksonville, Florida.

* * *

Members of the Joint Air Transport Committee of the Association of British Chambers of Commerce, the Federation of British Industries and the London Chamber of Commerce, visited the works of Saunders-Roe, Ltd., on May 27th. After visiting the development and research department they were entertained to lunch and later inspected the Princess flying boats under construction.

In order to handle the greater demand for bookings, American Overseas Airways increased trans-Atlantic services on June 2nd to 21 round trips a week. There are ten flights each week in and out of London, four round trips weekly to Stockholm, three to Amsterdam, and two each to Oslo and Copenhagen. Some of the London and Amsterdam flights extend to Germany.

* * *

A new weekly service between Rome and South America was recently started by Alitalia, the Italian airline in which B.E.A. has a 40 per cent financial interest. Flights leave Rome every Monday flying via Dakar, Natal, Rio de Janeiro and Sao Paulo to Buenos Aires. A similar service operated by Alitalia calls at Montevideo instead of Sao Paulo.

FROM THE CLUBS

THE West London Aero Club started its summer fixture-list on Saturday, May 21st, with a landing competition which was enjoyed by competitors and spectators alike. Twenty-six members entered the contest, which required an engine-off descent from 1,000ft, the aircraft to be brought in over one tape, to land and to come to a standstill as near as possible to a second tape, without overshooting it.

Mr. D. E. Ewart of the Fairey Flying Club was the eventual winner, with Mr. S. G. Nicholson of the West London Aero Club second and Miss S. Van Damm, of the Windmill Theatre Flying Club, third. Both the Fairey and the Windmill Theatre Clubs are affiliated to the West London.

During the season the W.L.A.C. is holding three cross-country competitions, both open and under the hood, and finishing up with a "precautionary landing" competition. The entrant securing the most marks from these four competitions will qualify for the Windmill Theatre Challenge Cup, to be presented at the end of the season.

* * *

THE first of three air displays and rallies to be held during the summer by the Cowes Aero Club is to take place on Sunday, June 19th. Flying competitions and other contests have been arranged and all flying clubs have been invited to attend. The exhibition side of the display will include mock-combat flying, parachute jumping and wing-walking. Following the display, a dance will be held in the club house for members and their guests.

Introduction of the new licensing regulations has not, apparently, in the least diminished the enthusiasm of student pilots, and the flying instructors have been kept very busy. A new one of the latter to join the staff is Mr. R. Langridge, who was previously an instructor in the R.A.F.

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FURTHER details are now available of the air display to be held by the Darlington and District Air Centre on Saturday, June 11th, at Croft-on-Tees Airfield. An arrival competition has been organized to take place between 1300 and 1400 hr, to be followed by the actual display. Events will include a demonstration of homing procedure by an Anson, formation flying and aerobatics by Spitfires, a parachute descent, crazy-flying by S/L. W. Evans in a Tiger Moth, target bombing, and a demonstration of the Slingsby Motor Tutor and the Chrislea Super Ace. There will be the usual competitions for visiting aircraft.

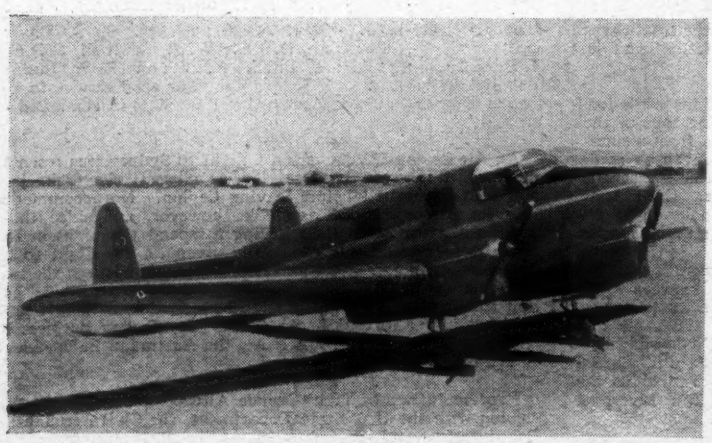
* * *

AT a time when flying clubs are using every argument to obtain financial support from the Government it is interesting to learn of an independent scheme to encourage private flying. The Wiltshire School of Flying, Ltd., has for long endeavoured to reduce the cost of flying to its members but the steady rise in labour, material and fuel costs—with heavy rental and rates since a move to Thruxton—have added to the difficulties. The School has now introduced a "pay-as-you-learn" scheme based on the new requirements for the Student Pilot's Licence.

As Mr. J. E. Doran-Webb pointed out at a recent meeting of the A.B.A.C., the new licence requirements do not, in fact, increase the cost of learning to fly. In 1938, he said, very similar regulations were in force in the United States and pupils of civil flying schools learned to fly up to student-pilot level on such aircraft as the Piper Cub, which entailed about seven hours dual instruction. After flying with that licence for a period, and when some 30 hours' flying had been completed, further flying and a ground course qualified the pilot for a private pilot's passenger-carrying licence.

Mr. Doran-Webb thought that the new licensing procedure was intended to achieve the same purpose on this side of the Atlantic and he thought the old "A" licence was dangerous: any pupil after completing three hours solo could, and frequently did, carry any number of passengers without infringing the regulations. Whereas the flying schools would not permit newly qualified pilots to carry passengers there was nothing to prevent private owners from doing so. The new regulations did ensure that no pilot could carry a passenger until he had done a minimum of 30 hours' flying. Furthermore, the prospective pilot could, as a student pilot and with the approval of his instructor, fly to any airfield he wished instead of being restricted to a radius of three miles of his home airfield as when qualifying for the "A" licence. Having flown the requisite number of hours the pilot who wished to carry passengers would be required to study elementary meteorology, navigation, air traffic control and air legislation, and on being proficient and having passed the examination he would obtain his Private Pilot's Licence.

The Wiltshire Flying Club is a member of the A.B.A.C. which, of course, requires certain flying and servicing standards to be maintained. In the new system the club's student pilots' course covers seven hours' flying instruction, either dual or solo. This can be obtained in any of the following instalment plans: (a) £3 down and 34 instalments of 12s 6d, total, £24 5s; (b) £6 down and 30 instalments of 12s, total, £24; (c) £9 down and 20 instalments of 14s 6d, total, £23 10s; (d) £12 down and 20 instalments of 11s, total, £23. The charges include the fee for the medical examination (15s) and three months' membership of the Wiltshire Flying Club (£1 1s), which entitles the student to all Club facilities, with accommodation and meals at club rates. It also covers all ground instruction and the loan of instructional handbooks. There are no extra charges. Any additional flying over the amounts shown can be paid for by further instalments.



TURKISH TOURER: The T.H.K. 5 series, manufactured by Turk Hava Kurumu Ucak Fabrikasi (the Turkish Air League factory at Ankara), is designed to accommodate six persons, including a crew of one or two pilots, or, in a special model, two stretcher-cases and attendants. Turkish-built Gipsy Majors provide the power and the cruising speed is said to be about 125 m.p.h.

BRITISH CONTRIBUTION

A Review of Various Papers Presented at the Anglo-American Conference

LAST week we gave a brief summary of the paper read by MR. G. R. EDWARDS (chief designer, Vickers Armstrongs, Ltd., Weybridge works) at the second I.Ae.S.-R.Ae.S. Joint Conference held in New York, and in the two succeeding pages we include a more detailed summary of that paper. Limitations of space make it impossible at this juncture to give other than a very brief digest of some of the other British papers, but we hope in subsequent issues to publish rather more fully detailed abstracts of these.

MR. F. M. OWNER, chief engineer (engines), Bristol Aeroplane Co., Ltd., titled his paper *The Propeller Gas Turbine in Service*, and in a discussion of the relative advantages of the free-turbine type unit, showed that the turboprop offers an advantage in efficiency over the pure-jet up to speeds of 500 m.p.h.

The author devoted some attention to bench-testing and followed this up with a description of the methods adopted for flight-testing, correcting observed data, and so forth. An excellent description of the Theseus-Lincoln aircraft in service with Transport Command was given, together with details of preliminary crew training so essential in a project of this nature. The experiences of first and subsequent flights were described in detail, and the excellent mechanical condition of the engine after 212 hours' flying was shown by photographs.

Materials and Design

Mr. Owner's colleague, MR. A. E. RUSSELL, chief engineer (aircraft), Bristol Aeroplane Co., Ltd., lectured on *Aircraft Materials from the Designers' Point of View*. He started by stating that the dominating problem in the design of aircraft structures was the stability of panels in compression, and gave it as his opinion that close agreement with experimental results suggested that a theoretical analysis formed the rational basis for the selection of the materials of construction, both as regards kind and quality.

Mr. Russell thought that important structural advantages would accrue from the use of metal adhesives, and that with their use would come about an increase in the demand for very thin sheet and strip. An examination of the statistical variation of dimensions and strength of sheet and extrusions was made to show that, in certain circumstances, it was possible to make better use of the material than was allowed by normal specification conditions.

The author devoted some attention to the fact that development was needed to reduce the variability of directional properties of materials, and concluded by reasoning that the results of fatigue tests on standard specimens might be misleading if used indiscriminately in design. It was essential that laboratory work should be correlated to typical structures.

The Application of Materials from the Manufacturers' Point of View was presented by MAJOR P. L. TEED, deputy chief of aeronautical research and development, Vickers Armstrongs, Ltd. He stated that a greatly increased knowledge of the physics of the metals of aircraft construction was essential, and gave it as his conviction that the aircraft designer was being called upon to design dynamically-loaded airframes, or structures, solely on the basis of a very scanty knowledge of a very few static properties.

Since stratospheric temperatures might on occasion be below −90 deg C, the author insisted on the need for extensive research as to the low-temperature mechanical properties of metals. He pointed out how adversely both the static and dynamic properties of ferritic steels could be influenced by a relatively small fall in temperature, but stated that, conversely, he had failed to find any evidence that, at stratospheric temperatures, any of the aluminium alloys suffered a reduction in mechanical properties.

In respect of fatigue, the author drew attention to grave inaccuracies of certain past dicta and emphasized the small value to the designer of the conventional fatigue tests. He thought it essential that to establish the elimination of the unexpected, aircraft should be extensively equipped with recording strain gauges.

MR. D. KEITH-LUCAS, chief designer, Short Brothers and Harland, Ltd., spoke on *The Relative Efficiencies of Large Landplanes and Flying Boats*, and examined dynamically-similar aircraft projected for the same route, the comparable landplane and flying boat having the same engines and payload. He showed that the boat is lighter at weights above 100,000 lb, and faster at very high weights. The point of equal speed, which was almost independent of range, speed or type of engine, fell between 250,000 lb and 500,000 lb. At these weights, the flying efficiencies were almost identical, but the boat had lower maintenance and airport costs. The lecturer concluded with the observation that very large aircraft were inevitable on trunk routes, but the cost of aerodromes to satisfy I.C.A.O. conditions would be prohibitive. On these grounds it was postulated that the large boat was therefore superior economically and was also shown to be safer and more reliable.

Future Civil Operation

In his paper, *Operating Factors Affecting the Design of Future Civil Transport Aircraft*, MR. CHRISTOPHER DYKES, deputy chief project engineer, B.O.A.C., gave a general survey of the problems which are likely to arise with the operation of future civil transports, particularly those powered with gas turbines.

The relationship of cruising speed to time-tables was examined for short and long routes, both single- and multiple-stage, and a new method of relating standards of passenger comfort was described and exemplified by application to the selection of an optimum layout.

Cruise control procedures were exhaustively discussed, and a comparison given for piston- and turbine-engined aircraft with particular reference to a new type of air mile per pound grid for gas turbines. The author described methods of route analysis, and the policy behind reserves was presented with statistical evidence. The use of wind-frequency curves was examined with reference to "fixed sector fuel" and "minimum payload" operating techniques, and the paper concluded with a brief indication of the effect of these factors on design.

"THE WING" DESTROYED

WHILE engaged on a routine handling flight on May 30th, the first prototype of the Armstrong Whitworth A.W.52 tailless research aircraft crashed and was destroyed. This machine, the more powerful of the two prototypes, was powered by two Nenes. Causes of the accident will be the subject of an inquiry. The pilot, Mr. J. O. Lancaster, D.F.C., succeeded in escaping from the machine by means of the Martin-Baker ejector seat. This is believed to have been the first occasion—certainly in this country—on which a pilot-ejector seat has been used in an emergency.

I.o.W. WEEK-END

SEVENTY aircraft, including ten from Belgium and one from Sweden, attended the Whitsun week-end meeting of the Bembridge and Sandown Aero Club. The round-the-island race was won by Mr. C. G. Alington (Sparrowhawk) at 159.5 m.p.h., with Mr. Hughes (Tiger Moth) second at 100 m.p.h. and Mr. Stewart (Proctor) third at 143.5 m.p.h. Miss Anita d'Ray (Auster) won the closed-circuit race, with a Belgian visitor, M. Sempereur (Auster) second. In the *concours d'élégance*, Mr. Voles' Miles Messenger was awarded first prize, while a landing competition was won by Cdr. Ward (Auster).

TURBINE-POWERED TRANSPORTS

A New Conception of Passenger-comfort : Mr. G. R. Edwards' Paper at the Anglo-American Conference

IT is now possible to give a rather more detailed digest of the paper "Turbine-engined Transport Aircraft," which was among those read at the Anglo-American Conference (summaries of some of the others appear on the previous page). The author was Mr. G. R. Edwards, M.B.E., B.Sc., F.R.Ae.S., A.M.I.Struc.E., chief designer of Vickers-Armstrongs, Ltd., Weybridge Aircraft Section, and he began by describing the three existing Vickers aircraft upon which much of the analytical investigation in the paper was based. These were the Nene Viking, the Dart Wellington and the Viscount. In addition, he outlined the project of a pure-jet version of the Viscount, due to fly fairly soon.

Contemporary British turbines were then reviewed by the lecturer, who went on to observe that, due to confusion between the pure jet and the airscrew turbine, the high propulsive efficiency of the latter at moderate speeds —about 80 per cent—was often overlooked.

Turning to the question of operating economy, Mr. Edwards examined comparative costs as between turbine and piston engines on both medium- and long-range types of aircraft (Figs. 1 and 2). He went on to discuss the matter from the aspect of fuel reserves and the saving in journey time, as well as the problems of temperature accountability and high-altitude operation. Such investigation, he said, showed that the turboprop was actually more economical than the piston engine, but that pure jets were as yet unsuitable for civil transport work except in special circumstances.

Going on to review the virtues of the turbine for passenger-aircraft work, the lecturer demonstrated comparative curves of noise and vibration levels (Figs. 3, 4 and 5), and emphasized the effect of lower vibration levels on airframe and equipment maintenance. He said that during nearly 200 hours of test-flying on the Viscount prototype, it had not been found necessary to replace a single instrument.

Turning to safety, the speaker drew attention to the advantages of low-volatility fuel (kerosene) and to the fact that the low frontal area and installed weight of the turboprop made it possible for four engines to replace two piston engines in medium-weight aircraft.

Mr. Edwards then went on to make a detailed study of some of the technical problems relating specifically to turboprops, including airscrew-pitch control, slow throttle-response and windmilling drag. Finally, he discussed turbine installations, together with the results of investigations on ventilation, jet-pipe installation, de-icing and intake design. In summing up, Mr. Edwards said:—

"Although the airframe must be designed from the start with the knowledge that it is to employ turbines in order to make the best use of them, my experience of turbine engines, with and without propellers, in civil aircraft has convinced me that there is no engineering problem which is not capable of satisfactory resolution.

"Flying problems with turbines, in many cases, are easier to resolve than with piston engines. In others, special attention has to be paid to the design of the airframe: for example, high-drag flaps are needed to replace the high idling drag of a piston engine; on a turbine, with or without propellers, this factor tends to become a small idling thrust. The problem of propeller control on propeller turbines, either of the single shaft or the free turbine type, has been satisfactorily overcome, and the handling of the engine/propeller controls by the pilot is certainly no worse than with a piston engine.

Comparative Safety

"There has been a certain amount of loose talk to the effect that the safety of aircraft using kerosene is not higher than that of one using gasoline. This is not true, and there is no doubt that many lives lost due to fire after forced landings would have been saved had kerosene, with its relatively high flash-point and low rate of flame-propagation, been the fuel.

"Standards of comfort achieved with turbine transport aircraft are high for two reasons, namely, the almost complete absence of vibration and the great reduction in noise level. This must be qualified in the case of pure jets by saying that the passengers must be housed forward of the jet orifice, as experience shows that the jet 'rumble' aft of the jet-pipe is quite intolerable. The original criticism that the addition of a propeller to the turbine would destroy its inherent smoothness is known to be wrong.

"All the evidence that is so far available points to a striking increase in airframe and equipment serviceability due to this absence of power-plant vibration. This, in terms of increased utilization, may well be the biggest contribution towards increased earning power that the turbine engine will bring. Engine overhaul periods themselves are growing rapidly, and before long will be within striking distance of comparable piston engine times.

"The importance of maintaining height with a pure jet transport lays much greater emphasis on the need for a high standard of pressure-cabin engineering. It is not too much to say that it reaches a stage where it is as im-

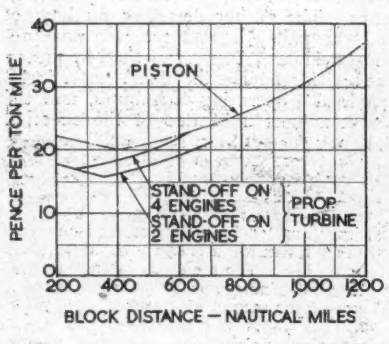


Fig. 1. Cost per ton-mile versus range, Viscount types: 200 miles diversion and 1½ hours stand-off.

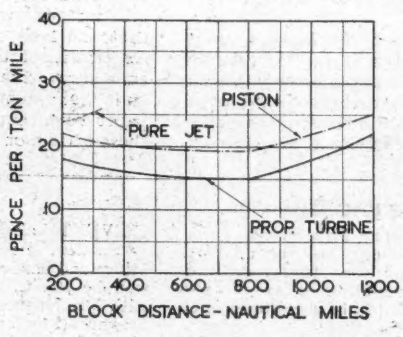


Fig. 2. Effect of reduced reserves, Viscount types: no diversion and half-hour stand-off.

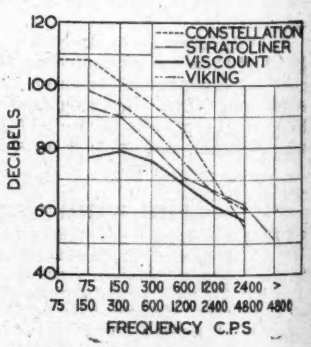


Fig. 3. Noise levels in rear cabin of four civil aircraft, plotted in terms of volume against frequency.

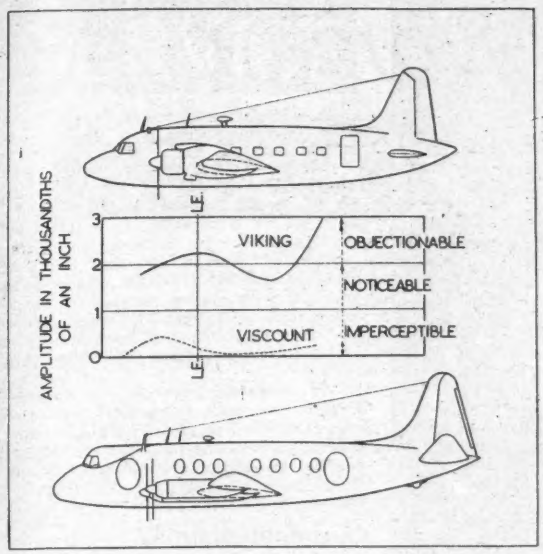


Fig. 4. Vertical vibration level in Viscount and Viking, showing toleration levels.

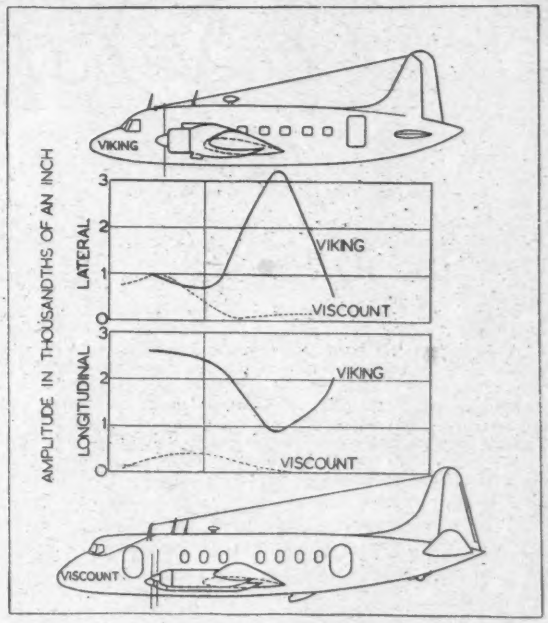


Fig. 5. Lateral and longitudinal vibration levels.

portant as, and must be given the same attention as, the primary structure.

"So far as economics, in terms of direct operating cost, are concerned, the propeller turbine has hitherto been confused with the pure jet. I am convinced that on short and medium ranges of up to 1,000 miles the propeller-turbine aircraft is at least as economical as a comparable piston-engine type. This statement is based on an operation employing the existing very high European reserves, and makes no allowance for improvement in either airframe or engine maintenance over that of a piston-engine aircraft. Over these ranges, and particularly with these reserves, a pure-jet aircraft is useless by virtue of the enormous fuel reserves it has to carry.

"Over the longer ranges of about 2,000 miles there is little to choose between the operating economics of the pure-jet, propeller-turbine and the compound piston-engined aircraft. All three are more economical in direct operating cost than their piston-engined equivalents.

"The pure-jet aircraft, however, still suffers from its lack of flexibility, which must impose considerable limitations on its practical operation. This defect is not nearly so important on the propeller turbine, the economic operation of which is so much less dependent on high forward speeds and the high altitude necessary to attain them. It may well be, therefore, that, even on these ranges, the right power plant to start turbine operation will be the propeller turbine.

"It is my conviction, from the reaction of seasoned travellers who have flown in the turbine-engined aircraft now available, that that in fact will be the position. The air-travelling public, once having had its taste of the comfort of a turbined-engined aircraft, will turn its back on what it now accepts as first-class air travel."

TURBOJETS WITHOUT TEARS

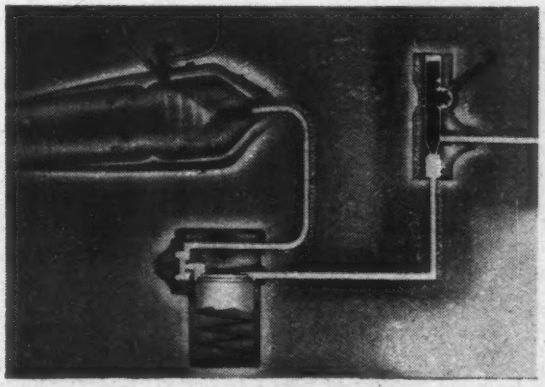
ENTITLED *Turbojet Propulsion*, an informative short film made with the co-operation of Rolls-Royce, Ltd., centres around a power unit of the Derwent type. It is intended to convey the principles and functioning of the gas turbine to an audience with limited technical knowledge of the subject. With the aid of animated diagrams and a clear, concise commentary, it succeeds in its purpose very well. A few minutes of running time are also devoted to the method of operation of the fuel and lubrication systems, automatic cycle and pilot's controls.

The producers, perhaps, felt that the film must be short if the interest of their intended audience was to be held. Watching it, we felt that they had possibly been a little modest, for enquiries among a representative audience, including ladies, indicated that all were most interested and would have enjoyed a few minutes more.

Suitable for exhibition to schools, universities, Services and flying clubs, the film would benefit in most instances by the attendance of a competent lecturer who might give some introduction, enlarge on certain details, and answer questions. This service is, in fact, provided for in the hire arrangements. It was our impression that the brief introductory talk concerned with what gas-turbine propulsion has to offer in military and civil fields, and what operational problems are now being tackled, would be of value to most intended audiences.

The photographs and animated diagrams comprising the main portion of the film are relieved by some short but delightful aerial sequences of Meteors.

Turbojet Propulsion is an addition to the list of technical films in the non-theatrical library of Sound-Service, Ltd., 269, Kingston Road, London, S.W.19, and applications for its hire may also be made to Rolls-Royce, Ltd. The running-time is 16 minutes and the film is available in both 16 and 35 mm sizes. Ronald H. Riley was the producer, and the director was David Villiers.



Fuel control: a typical "frame" from the animated portion of the film "Turbojet Propulsion".

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

PROPULSIVE THRUST

—and the Ramjet : A Reader is Puzzled

IN conversation I have had with many people, and from what I have been able to read on the subject, it appears extremely difficult to define where exactly the propulsive thrust of a turbojet is translated from the gas-flow to the physical structure of the engine.

There does, however, seem to be the possibility that the total thrust is in fact an aggregate of a myriad individual thrusts on various portions of the engine's entrails.

Not so in the ramjet though; and this foxes me completely. Here is a pipe, a plain tube except for the intrusion of fuel-burner nozzles. The air comes in, is mixed with fuel and burnt, and then rushes out at the back. In doing this it thrusts the pipe forward. Possibly those readers who may have worked out this particular problem could put forward an understandable explanation. D. SMITH.

Cirencester, Glos.

DEFENCE OF HONG KONG

A "Flying-boat Fighter" Situation

A SHORT article, "British to Defend Hong Kong," appeared in the May 20th issue of a Buffalo, N.Y., paper. It states that "fighter planes have arrived at the totally inadequate Kaitak airfield on the mainland." From this I surmise that this is the only airfield available for the Defence of Hong Kong.

If the Communist forces do decide to attack this Colony, then an airfield on the mainland is going to be overrun or rendered untenable in a short space of time. Presumably, in such a contingency, it is intended to maintain the air defence of Hong Kong by carrier-based aircraft.

Instead of jeopardizing carriers on such a task would it not be better to press into service the S.R./A1 fighter? A mere handful of these planes would surely be invaluable in such a situation as this. I. SCOTT-BUCCLEUCH.

Toronto.

[This is certainly the sort of situation in which the flying-boat fighter may eventually prove its value. At present, of course, the S.R./A1 is still in the prototype stage.—ED.]

BRITISH AIRLINE PILOTS

—on Foreign Lines : A Scandinavian Explanation and Appreciation

IN view of the fact that discussion may have arisen concerning the termination of employment of airline pilots, perhaps I may be permitted to make a statement on behalf of Norwegian Airlines.

Owing to policy reasons, we were obliged to relinquish the services of some of our skilled pilots. Amongst these were British pilots who had been working with our company since 1946 and 1947. During the time they were with us we learnt to appreciate their skill and fine comradeship, and, if it had not been for the rules adopted in most countries, we would still have the pleasure of their co-operation. When a country is up against difficulties, however, it always has to protect its own citizens first, and concerning the British pilots in our service, this was the unavoidable issue.

May I, however, take this opportunity of expressing our deep appreciation of the fine work the British pilots did in our company during the most difficult period after the war?

I am happy to say that, in spite of the unavoidable changes mentioned above, we still have one British pilot in our service, Captain Davis, who at the time of writing is flying a new Sandringham flying-boat over to Norway. He is remaining in the service of our organization and will continue to operate on one of our most complicated lines, which takes him frequently across the Arctic circle. ODD MEDBOE,

Oslo. Director of Public Relations, Scandinavian Airlines.

AERONAUTICAL ENGINEERS

Too Much Unskilled Labour?

I WOULD like to remind Mr. J. H. Stevenson (May 19th) that the mechanics of whom he speaks left the Corporations two years ago—they only had these jobs as stop-gaps until industry settled down to post-war production. The ex-R.A.F. types now leaving or being made redundant are facing up to the fact that if they are prepared to work "a fair day's work for a fair day's pay" they are 50 per cent better off outside.

Both the A.E.A. and A.E.U. have failed to obtain good wages and conditions. I can see airline maintenance drifting fast to a "conciliatory-grade" job, in the same way that L.P.T.B. electric stock is maintained. There is, of course, no reason why the employment of up-graded car-cleaners should not have its counterpart in the Corporations—with rigid inspection and bags of spares, not forgetting white lines painted on workshop floors each week. Aircraft may still keep their present accident-free record.

It is, no doubt, the Government's intention that unskilled labour shall be the order of the day. It has been proved on London's electric railways that the cost of delay through faulty workmanship by unskilled hands is cheaper than the employment of 100 per cent skilled mechanics; the public, of course, just has to "take it." CHARLES NICOLLAS.

Uxbridge, Middlesex.

A CHILDHOOD MEMORY

What was this Pioneer Aircraft?

POSSIBLY some old-timers among your readers can assist me in putting a "framework and title" to a childhood memory. I have a very brief but fairly clear recollection of being taken by my father to see what must have been one of the earliest attempts at heavier-than-air flight in this country.

The place was, I think, a field, or park, in the neighbourhood of Hanger Hill, Ealing, not far from my home (though it may have been at Park Royal, a couple of miles farther away). I must have been between three and four years old, which puts the date at 1907-1908.

This is the mental picture: wooden rails, or runway, down a slightly sloping field; at the beginning of the runway, a white biplane or triplane of very complicated construction, rather like Col. Cody's or Sir Hiram Maxim's machines (though judging from literature I have studied I do not think it can have been either of these two pioneer aircraft). There are a fair number of people present, and a murmur of excitement rises as the machine runs along the woodwork but, I believe, never becomes airborne; and there the picture fades.

Can anybody fix it for me, please? D. P.

London, S.W.19.

FORTHCOMING EVENTS

June 11th.—Royal Naval Air Station, H.M.S. "Gamecock": King's Birthday Review and Navy Day, Bramcote airfield, Nuneaton, Warwickshire.
June 11th and 12th.—Royal Air Forces Association: Annual Conference, Margate.
June 11th to 17th.—R.A.F. Small Arms Association: The 23rd Annual Championship Meeting.
June 11th.—Darlington and District Aero Club: Air Display, Croft airfield.
June 11th to 13th.—Yorkshire Aeroplane Club: International and Club Invitation Rally.
June 12th to 19th.—Italian International Air Week, Rimini and Venice.
June 16th to July 2nd.—Royal Tournament, Olympia.
June 18th.—Bristol and Wessex Aeroplane Club: Annual Garden Party.
June 18th.—R.Ae.S. (Brough): Flying meeting and Cirrus Trophy Competition, Brough.
June 18th.—Parachute Regimental Association: Old Comrades' Day, Aldershot.
June 18th and 19th.—Aero Club de Basse Normandie: Fiers de l'Orne Rally.
June 19th.—Air League of the British Empire (Portsmouth): Garden Party, The Airport, Portsmouth.
June 19th.—Cowes Aero Club: Air Display.
June 22nd to 24th.—Institute of Transport: Congress at Buxton.
June 26th.—Northern Heights Model Flying Club: Gala Day, Hawker airfield, Langley, Bucks.
June 26th to July 3rd.—Aero Club d'Italia: International Air Week, Milan.
July 1st.—R.A.F. Golfing Society: Summer Meeting at Moor Park Club, Herts.
July 2nd.—R.N. Air Station, Lossiemouth: "Open Day" and Flying Display.
July 2nd to 4th.—Royal Aero Club: Private air rally at Deauville. Guests of M. André.
July 2nd to 10th.—Tour de France Aérien.
July 4th to 11th.—Royal Aero Club: Private Air rally to Spain.
July 9th.—Royal Naval Air Station, Culham, Oxford: Air Display.
July 9th.—Redhill Flying Club: Garden Party.
July 16th.—Royal Naval Air Station, Anthorn, Kirkbride, Carlisle: Navy Day.
July 16th and 17th.—Royal Aero Club: Private air rally at La Baule, St. Nazaire. Guests of Mme. André.
July 17th.—Cowes Aero Club: Air Display.
July 23rd.—"Daily Express" Air Pageant, Gatwick Airport.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

A Week of Parades

FOUR significant parades, at R.A.F. stations Halton, Cottesmore, Cranwell and Spitalgate, took place last week. On June 1st approximately 100 aircraft apprentices of the 53rd entry were inspected at Halton by Air Marshal Sir Aubrey B. Ellwood, K.C.B., A.O.C.-in-C., Bomber Command. Three squadrons of apprentices, a military band, a pipe and fife band and, of course, Lewis II, the goat mascot, took part.

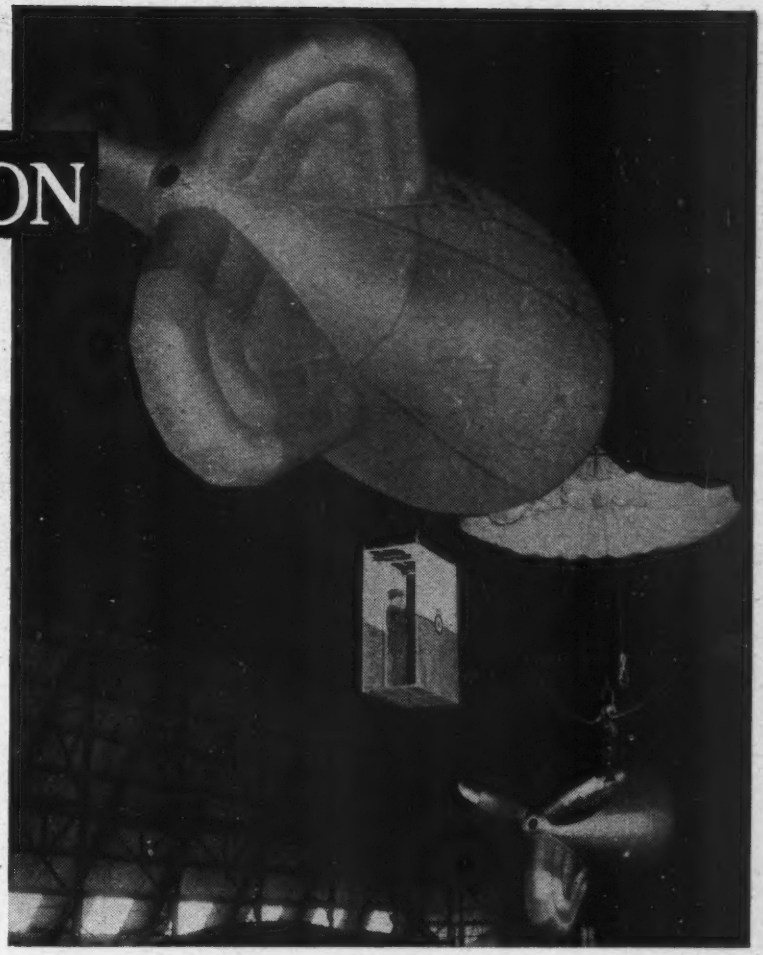
On the same day, at Spitalgate, the first 22 National Service airmen to become officers in the R.A.F. for the period of their service, passed out from the Officer Cadet Training Unit. These applied for commissions when they registered last December and are among the 500 N.S.A. men who will now be commissioned each year.

On the same occasion 14 cadets passed out as officers in various ground branches. The reviewing officer was Air Vice-Marshal L. Darvall, C.B., M.C., Air Officer-in-Charge of Administration, Flying Training Command.

At Cranwell on June 2nd another parade, before Air Chief Marshal Sir George Pirie, K.C.B., C.B., Air Member for Supply and Organization, marked the passing out of 42 radio apprentices. In addition, 600 apprentices were on the square with the station band.

Also on June 2nd there was a course graduation ceremony and presentation of station and unit badges at R.A.F. Station, Cottesmore. Between 300 and 400 of the personnel paraded. Twelve officers—all ex-aircrew categories granted permanent commissions and now trained as pilots—and fourteen cadets representing the first "all-through" course to pass out from Cottesmore, were presented with their wings by Air Marshal Sir Hugh Walmsley, K.C.I.E., C.B., C.B.E., Deputy Chief of the Air Staff. The station badge consists of an American Star, signifying the fact that Cottesmore was an American Station during the war; a hunting horn (Cottesmore Hunt), and the horseshoe from the Arms of Oakham, the local town. The motto is *We rise to our obstacles*. The unit badge of No. 7 Flying Training School consists of a key on three maple leaves. The key is taken from the Arms of Peterborough, where the unit was formed in December, 1935, and the maple leaves represent its transfer to Canada in 1940 to 1944; the motto is *Arming to Strike*.

The badges were presented by the Lord Lieutenant of Rutland, the Earl of Ancaster. Also present were the Earl of Gainsborough and Lady Alice Willoughby. The U.S.A.F. was represented by Col. Barrett and Capt. Seaman, who served at Cottesmore with the IX Troop Carrier Command during the war.



PRACTICE FOR AMAZONS: In a balloon hangar at Cardington, W.R.A.F. members of the Service parachute team which is to take part in the Royal Tournament at Olympia, from June 16th to July 2nd, are practising controlled 100ft jumps with open parachute.

R.I.A.F. Technical Training

FOLLOWING the Indian Government's decision to use British methods and equipment in the instruction of R.I.A.F. technicians, Air Service Training, Ltd., of Hamble, has received a contract to establish and operate a training centre on similar lines to the R.A.F. apprentice school at Halton. It will include an engineering college for officers. For the first five years, the centre will be situated near Jalahalli, Bangalore, and staffed mainly by British personnel; after five years it is expected that sufficient Indian officers and instructors will have been trained to take over the college's future permanent buildings at Yellahanka. A.V-M. Mukerjee, Deputy Chief of Staff, R.I.A.F., was trained at Cranwell, and has laid down the same high standards for the R.I.A.F.

Camps for Cadets

BY the end of this summer, every A.T.C. cadet—there are 44,000 in the United Kingdom—will have had the opportunity of a week's camp. Squadrons of cadets will be allocated to 39 R.A.F. and eight Naval stations. Some of the camps have accommodation for 200-300 cadets, but the majority are for parties of between 20 and 100.

Facilities for flying and gliding are available at most stations, but cadets are also expected to assist airmen and ratings in such duties as refuelling and laying out flare-paths. Welfare at each camp is in the hands of one Service officer and two A.T.C. officers.

New S.A.S.O. for Transport Command

TAKING the acting rank of Air Vice-Marshal, A. Cdre. J. A. Gray, C.B.E., D.F.C., G.M., has been appointed to Transport Command as Senior Air Staff Officer.

Until recently A.V-M. Gray was head of the R.A.F. Delegation in Greece. Before taking up that appointment in January, 1947, he commanded No. 91 (Bomber) Group from February, 1944, until October, 1946. Previously he commanded a bomber base, after having been Deputy S.A.S.O. at Bomber Command H.Q. Earlier in the war he commanded

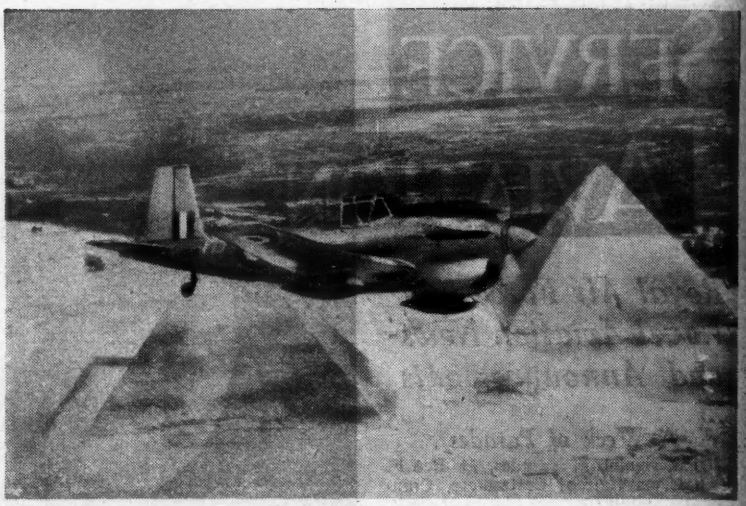
Service Aviation . . . . .

R.A.F. stations at Andover and Honington, and was S.A.S.O. of Nos. 1 and 3 Groups, Bomber Command. He was awarded the George Medal for assisting one night in May, 1941, in the rescue of two members of the crew of a crashed aircraft. From exploding ammunition, incendiaries, flares and petrol tanks, A.V-M. Gray (then a group captain) received severe burns on the head, and his uniform was destroyed.

Auxiliary Appointments

NEW appointments in the R.Aux.A.F., announced by the Air Ministry, are of commanding officers for two fighter control units. W/C. M. S. Anthony, who is to command No. 3508 (County of Northumberland) F.C.U. (Long Benton), has seen service in both world wars. Enlisting in the ranks of the Northumberland Fusiliers, he became a captain before transferring to the R.A.F. in 1918, from which he was released with wounds and ill-health two years later. He was commissioned in the R.A.F.V.R. in December, 1939, was on operational duties at No. 13 Group for two years, and finally became an aircraft controller, reaching the rank of wing commander.

With acting rank of Squadron Leader, F/L. J. Hodgson, D.F.C., takes command of No. 3608 (North Riding) F.C.U., located at Thornaby. From October, 1940, this officer spent six years on flying duties. His D.F.C. was awarded for attacks on the majority of heavily defended German targets, and in particular for a daylight sortie against submarine building yards at Danzig. After service with 106 and 83 Squadrons, he became a flying instructor. S/L. Hodgson joined the R.Aux.A.F. in January, 1947, as a pilot with No. 608 (North Riding) Squadron, to which his new command is affiliated.



GETTING AROUND: Seen over the Kephren Pyramid is a prototype Balliol 2, which recently completed trials at the Tropical Experimental Unit, Khartoum. Some details of its 5,000-mile journey to Africa are given below.

Canadian Trophy Awarded

SINCE 1927, the McKee Trans-Canada Trophy has been awarded annually for meritorious service in the advancement of aviation in Canada. This year's winner is F/O. R. B. West, D.F.C., A.F.C., the third serving R.C.A.F. officer to receive the award. F/O. West was employed on search and rescue duties from the end of the war until last February, and has logged over 2,000 hours on this work alone, many of them during adverse weather conditions. In June of last year he undertook the first large-scale rain-making operation in the Dominion and succeeded in relieving a drought-stricken area. The trophy was won last year by Captain P. A. Pawson, of Trans-Canada Airlines.

TAKING A BACK SEAT: A twelve-minute turn by 70 police dogs of the R.A.F., together worth more than £6,000, will be a highlight of this year's Royal Tournament at Olympia. These two animals appear contented with the programme of instruction for Olympia—their trainers' comments are not known.

Balliol Trials

AS reported in *Flight* of May 26th one of the four prototype Boulton Paul Balliol 2s has been undergoing tropical trials at Khartoum. The aircraft was equipped with drop tanks for the flight from Boscombe Down to Eastleigh (Nairobi) where further trials were made after a pause at Khartoum. S/L. P. P. C. Barthropp, D.F.C., flew the Balliol, and his navigator was S/L. D. M. T. McRae, D.F.C. The route taken was Boscombe Down—Istres El Aouina—Castel Benito—Benina—El Adem—Fayid—Wadi Halfa—Khartoum Malakal—Juba—Eastleigh.

Reunion

DETAILS of a reunion dinner for all ranks of No. 110 M.U. (Brindisi and Castel Benito) are available from T. C. Anderson, 43, Fernhurst Road, Fulham, London, S.W.6.

C.S.E. Inspection

AN innovation to make the public better acquainted with its nearest R.A.F. station was a feature of the inspection of the Central Signals Establishment, Watton, Norfolk, on Friday, May 27th. The Air Officer Commanding No. 90 Group, A.V-M. R. G. Hart, C.B., C.B.E., was responsible for the idea, and the Commanding Officer, A. Cdre. L. Dalton-Morris, invited relatives in the neighbourhood to watch the ceremonial parade and inspection. Although the ceremony began before 0900 hours, several hundred visitors witnessed the 750-strong parade.

R.A.F. Permanent Commissions

THE following airmen have been selected for appointment to permanent commissions in the Royal Air Force, in the branches shown:

TECHNICAL BRANCH.

Warrant Officers: J. M. Beeby, V. J. Eva, N. McL. Gibson, J. Littler, D. W. Wallis.
Flight Sergeants: R. G. Carr, D. A. Emm, G. J. Higginbotham, J. W. H. Jones, C. King, J. H. Linford, K. T. W. Mackenzie.
Sergeants: P. D. Beevers, L. J. Bristow, T. J. Darvell, C. W. Orwin, H. Pepper, R. W. Wright.
Corporals: C. H. T. Pennal, J. G. Sinclair.

SECRETARIAL BRANCH.

Warrant Officers: G. Dodds, W. P. Foreshew.
Sergeant: R. P. Bateman.

EQUIPMENT BRANCH.

Warrant Officers: G. A. Francis, L. N. Tutt.
Flight Sergeants: G. F. Holland, A. W. K. Moody, R. F. Rowlands, R. W. H. Todd, B.E.M.
Sergeant: P. D. Horton.
L.A/C.: J. F. Marshall.

R.A.F. REGIMENT.

Warrant Officer: J. MacFayden.
Sergeant: T. Balding.

AIRCRAFT CONTROL (For Fighter Control Duties).

Master Pilot: J. F. Archer.